VPDES PERMIT FACT SHEET

This document gives pertinent information concerning the reissuance of the VPDES permit listed below. This permit is being processed as a major, municipal permit. The effluent limitations contained in this permit will maintain the Water Quality Standards 9 VAC 25-260-10 et.seq. The discharge is a result of the operation of a municipal wastewater treatment plant treating sewage originating from a residential population and commercial businesses. This permit action includes revised effluent limitations and special conditions in the permit.

1. Facility Name: Lawrenceville Wastewater Treatment Plant (WWTP)
Location: 380 Meadow Lane
Lawrenceville, VA 23868

Facility Owner: Town of Lawrenceville
Owner Contact: C.J. Dean
Title: Town Manager
Mailing Address: 400 North Main Street
Lawrenceville, VA 23868
Telephone: (434) 848-2414
Email: cjdean@lawrencevilleweb.com

Facility Operator: Robert Williams
Telephone: (434) 848-2729
Email: wwtp@lawrencevilleweb.com

2. SIC Code: 4952

3. Permit No. VA0020354 Permit Expiration Date: September 10, 2012

4. Application Complete Date: Date: April 10, 2012

Permit Drafted By: Jeremy Kazio Date: May 11, 2012

DEQ Regional Office: Piedmont Regional Office

Reviewed By: Tamira Cohen Date: May 23, 2012
Curt Linderman Date: June 7, 2012, June 12, 2012
Kyle Winter Date: June 15, 2012
EPA Region III Date: June 28, 2012

5. Receiving Stream:

Name:	Roses Creek
River Mile:	5ARSE000.28
Basin:	Chowan and Dismal Swamp
Subbasin:	Chowan River
Section:	3
Class:	III
Special Standards:	None

7-Day, 10-Year Low Flow (7Q10):	0.372 MGD
1-Day, 10-Year Low Flow (1Q10):	0.317 MGD
30-Day, 5-Year Low Flow (30Q5):	0.973 MGD
30-Day, 10-Year Low Flow (30Q10):	0.626 MGD
7Q10 High Flow:	3.42 MGD
1Q10 High Flow:	2.62 MGD
30Q10 High Flow:	5.17 MGD
Harmonic Mean Flow (HM):	3.88 MGD

Tidal? NO On 303(d) list? YES

Please see **Attachment A** for the Flow Frequency Memo by DEQ Water Planning Staff

6. Operator License Requirements: Class II
The recommended attendance hours by a licensed operator and the minimum daily hours that the treatment works should be manned by operating staff are contained in the Sewage Collection and Treatment Regulations (SCAT) 9 VAC 25-790-300.

7. Reliability Class: Class II
Reliability is a measurement of the ability of a component or system to perform its designated function without failure or interruption of service. The reliability classification is based on the water quality and public health consequences of a component or system failure. The permittee is required to maintain Class II Reliability for this facility.

8. Permit Characterization:

( ) Issuance	(X) Existing Discharge
(X) Reissuance	( ) Proposed Discharge
( ) Revoke & Reissue	(X) Effluent Limited
( ) Owner Modification	(X) Water Quality Limited
( ) Board Modification	(X) WET Limit
( ) Change of Ownership/Name	( ) Interim Limits in Permit
Effective Date:	( ) Interim Limits in Other Document (attached)
(X) Municipal	( ) Compliance Schedule Required
SIC Code(s): 4952	( ) Site Specific WQ Criteria
( ) Industrial	( ) Variance to WQ Standards
SIC Code(s):	( ) Water Effects Ratio
(X) POTW	(X) Discharge to 303(d) Listed Segment
( ) PVOTW	( ) Toxics Management Program Required
( ) Private	( ) Toxics Reduction Evaluation
( ) Federal	( ) Possible Interstate Effect
( ) State	( ) Storm Water Management Plan

9. Wastewater Flow and Treatment:

Table 1: Wastewater Flow and Treatment

Outfall Number	Wastewater Source	Treatment	Design Flow
001	Residential and commercial (residential population = ~4,600)	Screening, grit removal, primary settling, oxidation ditches, UV disinfection, post step aeration. See Item 10 for sludge handling and disposal.	1.2 MGD

Please see **Attachment B** for topographic map, aerial photo, and facility flow diagram**.**

10 Sludge Disposal: Sludge processing consists of two aerobic digesters followed by chemical dewatering. Dewatered sludge is hauled to the Brunswick Waste Management Facility (WMF) landfill, located at 107 Mallard Crossing Road, Lawrenceville VA, any time between 8 a.m. and 2 p.m. Monday through Friday by the permittee. See **Attachment C** for sludge process diagram and description, and a topographic map of the route taken by the sludge hauler from Lawrenceville WWTP to the Brunswick WMF.

11. Discharge Location Description: The Town of Lawrenceville WWTP discharges to Roses Creek in Brunswick County. The outfall is located at rivermile 5ARSE000.28.

Name of USGS topo map: Powelton– 9A (See **Attachment B**)

12. Material Storage: Soda ash is stored on site in 50-pound bags (approximately 15 at any time) in an enclosed shed. A small volume of muriatic acid used for cleaning ultraviolet (UV) light bulb casings is stored inside the UV building. Sealed polyethylene drums of polymer are stored under roof in the bio-solids truck loading area. Gasoline and oil for lawn mowers are stored in a fire-proof cabinet in the same shed as the machinery. Used machinery oil is stored in an enclosed container and kept under roof until removed periodically by a recycler.

13. Ambient Water Quality Information: Ambient water quality information was derived from data obtained from monitoring station 5ARSE001.22. Monitoring station 5ARSE001.22 is located on Roses Creek at the Route 678 bridge and is approximately 1 mile upstream of the discharge (see **Attachment D** for ambient monitoring data).

14. Antidegradation Review and Comments: Tier 1 __X___ Tier 2 _____ Tier 3 _____
The State Water Control Board's Water Quality Standards includes an antidegradation policy (9 VAC 25-260-30). All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect those uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

    The antidegradation review begins with a Tier determination. Roses Creek has historically been considered a Tier 1 water and antidegradation was not applied during the 1979 and 1996 modeling efforts. Both models indicate dissolved oxygen levels will fall to or below 5.0 mg/L during critical conditions (see **Attachment A** for Flow Frequency Analysis by J.Palmore, P.G., dated April 12, 2012).

15. Site Inspection: By Charles Stitzer on January 5, 2011. (See **Attachment E**)

16. Effluent Limitation Development:

(continued on next page . . .)

Table 2 –Basis for 2012 Permit Limitations

EFFLUENT CHARACTERISTICS		BASIS FOR LIMITS	DISCHARGE LIMITATIONS						MONITORING REQUIREMENTS	
			MONTHLY AVERAGE		WEEKLY AVERAGE		MIN	MAX	FREQUENCY	SAMPLE TYPE
Flow (MGD)		NA	NL		NA		NA	NL	Continuous	Totalizing, Indicating, and Recording
pH		1,3	NA		NA		6.0 SU	9.0 SU	1 per Day	Grab
$cBOD_5$	Jan - Apr	2	20 mg/L	91 kg/d	30 mg/L	140 kg/d	NA	NA	2 Days per Week	24 Hour Composite
	May - Dec		10 mg/L	45 kg/d	15 mg/L	68 kg/d	NA	NA	2 Days per Week	24 Hour Composite
Total Suspended Solids (TSS)		4	20 mg/L	91 kg/d	30 mg/L	140 kg/d	NA	NA	1 per Month	24 Hour Composite
Ammonia as N	Jan - Apr	1,4	13.5 mg/L		13.5 mg/L		NA	NA	1 per Month	24 Hour Composite
Total Kjeldahl Nitrogen (TKN)	May - Dec	2	3.0 mg/L	14 kg/d	4.5 mg/L	20 kg/d	NA	NA	2 Days per Week	24 Hour Composite
Dissolved Oxygen (DO)	Jan - Apr	2	NA		NA		5.0 mg/L	NA	1 per Day	Grab
	May - Dec		NA		NA		6.5 mg/L	NA	1 per Day	
E.coli		1	126 N / 100 mL (Geometric Mean)		NA		NA	NL	5 Days per Week (between 10am and 4pm)	Grab
Zinc, Total Recoverable		1	61 µg/L		61 µg/L		NA	NA	1 per Three Months	Grab
Chronic 7-Day Static Renewal Survival and Growth Test: [*Pimephales promelas*]		4	NA		NA		NA	TUc=1.9	1 per Three Months	24 Hour Composite

1. Water Quality Standards (9 VAC 25-260)
2. Water Quality Based (April 25, 1996 Water Model Memo by Jon van Soestbergen, P.E.)
3. Federal Effluent Guidelines (40 CFR 133.102)
4. Best Engineering Judgment

pH: A pH limitation of 6.0 to 9.0 standard units is assigned to all discharges into Class III Nontidal Waters in accordance with the Water Quality Standards, 9 VAC 25-260-50, and Federal secondary treatment standard guidelines.

$cBOD_5$, TKN, and DO: These effluent limitations, including seasonal variations, are based on the recommended limitations in the April 25, 1996 memorandum by Jon van Soestbergen, P.E. titled *Recommended Effluent Limits for Lawrenceville STP (VA0020354)*. The memorandum is the result of a modeling effort that was originally conducted for Roses Creek in April 1996 due to Lawrenceville's request to expand the design flow of the WWTP from 0.6 MGD to the current design flow of 1.2 MGD. The original modeling effort was memorialized in an April 11, 1996 memo by Jon van Soestbergen, P.E in which both the Lawrenceville WWTP and Alberta Sewage Treatment Plant (STP) were included. This original model was later revised to exclude the Alberta STP in the April 25, 1996 memo, which did not change the original recommended limitations (See **Attachment D** for referenced memoranda and associated stream models).

TSS: In situations where a TSS limitation is not recommended by an applicable stream model, typical Agency practice has been to match the TSS limitation to the most stringent recommended $cBOD_5$ or BOD_5 limitation. This is the case for the 2012 TSS permit limitation, and is also in line with the 2007 and 2002 permit reissuances.

Ammonia as N and Total Recoverable Zinc: If it is feasible that a specific pollutant for which in-stream criteria are given in the *Virginia Water Quality Standards* (9 VAC 25-260 et.seq.) may exist in the facility's effluent, a Reasonable Potential Analysis must be conducted in order to determine if it is statistically probable that the permittee's future discharge may contain that pollutant in concentrations which are harmful to aquatic life and/or human health within the receiving stream. The first step of the analysis is to calculate the pollutant's acute and chronic wasteload allocations (WLAs), which are defined as the pollutant concentration that may be discharged by the facility over specific periods of time which will maintain the in-stream criteria referenced above. The WLAs are determined using a DEQ-sourced Excel spreadsheet called MSTRANTI, which requires inputs representing site specific data for critical flows, dilution, mixing, and water quality for both the receiving stream and the effluent. After the WLAs are calculated, a desktop computer application called STATS is utilized to determine if future pollutant concentrations may exceed the WLAs. The STATS application fits the WLAs, as well as observed effluent data, to separate lognormal distributions. If the projected effluent distribution exceeds either of the projected WLA distributions, then a limitation is deemed necessary. The limitation is equal to the concentration expected to be observed at the proposed limitation monitoring frequency within the most protective WLA distribution.

The inputs required by MSTRANTI for critical ambient water quality for this facility were calculated using data from monitoring station 5ARSE000.28 as indicated in Item 13 of this fact sheet. The effluent inputs were derived from DMRs and data submitted by the permittee for the 2012 permit reissuance (see **Attachment F**).

For Ammonia, GM 00-2011 requires that an expected value of 9.0 mg/L be entered into STATS as effluent data in order to bypass the program's Reasonable Potential Analysis because this pollutant has been established to exist in the final effluent of all municipal wastewater treatment facilities. The resulting annual Ammonia limitations of 3.57 mg/L (monthly average) and 4.52 mg/L (weekly average) were calculated. Considering the accepted concept that Ammonia comprises approximately 40%-60% of TKN, the level of treatment required to meet the existing TKN limitations of 3.0 mg/L and 4.5 mg/L are expected to control the Ammonia concentration in the facility's effluent. Therefore, the calculated Ammonia limitations were not applied to the 2012 permit during the months in which the TKN limitation applies (May - December).

For the months in which the TKN limitation does not apply (January-April), the limitation evaluation for Ammonia was conducted with data representing critical ambient and effluent flows and temperatures for these months only. The high-flow evaluation resulted in the conclusion that a limitation is not necessary to protect the Ammonia water quality criteria during these months. Due to antibacksliding policies, however, the limitation of 13.5 mg/L must be carried forward to the 2012 permit (see **Attachment G** for MSTRANTI and STATS printouts). Please note that the 2007 and 2002 evaluations also concluded that a high-flow Ammonia limitation is not needed, and it is unknown which permit cycle prior to 2002 that the limitation of 13.5 mg/L first appeared.

Also note that an evaluation of ambient stream flows and temperatures confirmed that January-April may still be considered the high flow months for the purposes of the 2012 permit reissuance (see **Attachment D**).

Other pollutants for which one or more data were reported greater than the test method quantitative limit (QL) in the 2012 permit reissuance application are contained in the table below.

Table 3 – Effluent Screening Analysis: Summary and Results

Chemical	Required QL (µg/L)	Test Required by:		Reporting Results by Sample Date				Evaluation Type*	**Limitation Needed?**
				8/10/2010	9/1/2010 & 9/15/2010	1/25/2012	2/8/2012		
		Att. A	Form 2A	RESULT (µg/L)	RESULT (µg/L)	RESULT (µg/L)	RESULT (µg/L)		
Copper, dissolved	0.50	√			1.88	1.4	1.67	1	NO
Nickel, dissolved	0.94	√			0.74	<0.50	0.50	1,2	NO
Zinc, dissolved	2.0	√			23.8	30.2	31.1	1,2	YES
Copper, total recoverable	--		√	7.39				NA	NO
Lead, total recoverable	--		√	0.56				1	NO
Nickel, total recoverable	--		√	0.98				2	NO
Zinc, total recoverable	--		√	27.6				2	NO
Nitrate as N	--	√	√		790	1120	1280	3	NO
Total Dissolved Solids	--		√		223000	219000	199000	3	NO
Total Kjeldahl Nitrogen	--	√	√		930	680	1330	3	NO
Total Phosphorus	--		√		280	<200	210	3	NO
Oil & Grease HEM	--		√		6400	<5000	<5000	3	NO

* Evaluation Type:

1 - Water Quality Standards: Aquatic Life (MSTRANTI & STATS)
2 - Water Quality Standards: Human Health (Direct comparison)
3 - No applicable comparison values

The MSTRANTI and STATS printouts for the aquatic life analyses above may be found in **Attachment G**. The aquatic life analyses resulted in the need for a Zinc limitation of 61 µg/L, which is more stringent than the 2007 Zinc limit of 75 µg/L. This more stringent limitation is the result of a lower average hardness value used for the 2012 WLA calculations. Review of Zinc compliance data submitted between 2002 – 2011 (see **Attachment F**) and those data submitted with the 2012 permit application, indicates that the permittee will be able to comply with the more stringent permit limitation without the need for a compliance schedule.

Human health direct comparisons are contained in the table below. Please note that this facility does not discharge to receiving waters that are considered to be a public water supply. Therefore, only those applicable criteria contained 9 VAC 25-260-140 of the Water Quality Standards under the column “Human Health: All Other Surface Waters” were used for the Human Health Criteria evaluation. Results of the human health evaluations indicated that all data points submitted by the permittee for the 2012 application were below the human health criteria, and therefore human health limitations for the parameters in the table below are not necessary.

Table 4 – Human Health Criteria Evaluation

Chemical	Reporting Results by Sample Date				Non-PWS Human Health Criteria (µg/L)	**Limitation Needed?**
	8/10/2010	9/1/2010 & 9/15/2010	1/25/2012	2/8/2012		
	RESULT (µg/L)	RESULT (µg/L)	RESULT (µg/L)	RESULT (µg/L)		
Nickel, dissolved		0.74	<0.50	0.50	4,600	NO
Zinc, dissolved		23.8	30.2	31.1	26,000	NO
Nickel, total recoverable	0.98				4,600	NO
Zinc, total recoverable	27.6				26,000	NO

E.Coli: The 2012 limitation and monitoring frequency for *E.coli* are expected to protect the primary contact recreation use bacteria criteria outlined in 9 VAC 25-260-170 (Water Quality Standards). The primary contact recreation bacterial in-stream criteria for protection of freshwater is 126 N/100 mL colony forming units (CFU) of *E.coli* bacteria based on a monthly geometric mean resulting from *at least* 4 weekly samples. This limitation is also in compliance with the WLA of 4.18E+12 cfu/year assigned to the Lawrenceville WWTP in the Roses Creek Bacterial TMDL as discussed in Item 25 of this fact sheet (see equation below for annual bacteria load expected for this facility).

$$\frac{126\ cfu}{100\ mL} \times \frac{1{,}000\ mL}{1\ L} \times \frac{3.785\ L}{1\ gal} \times \frac{1{,}200{,}000\ gal}{1\ day} \times \frac{365\ days}{1\ year} = 2.09 \times 10^{12}\ cfu/year$$

Chronic 7-Day Static Renewal Survival and Growth Test: [Pimephales promelas]: The Whole Effluent Toxicity (WET) limitation and monitoring requirement calculated for the 2012 permit is the same as that of the 2007 permit. An evaluation was conducted using the DEQ derived Excel spreadsheet WETLIM10 in order to produce a WLAa,c and WLAc from inputted ambient and effluent information. The WLA's and chronic WET monitoring results for *P.promelas* submitted between 1999-2012 were inserted into the STATS program, and the resulting limitation is the same as that derived for the 2007 permit (see **Attachment H** for WET data, WETLIM10, and STATS printouts, as well as guidance from OWP&CA).

17. Basis for Sludge Use & Disposal Requirements: The referenced requirements are applicable to facilities which land apply sludge; however, this facility does not land apply sludge.

18. Antibacksliding: All limitations in the 2012 permit reissuance are the same as or more stringent than the limitations in the 2007 permit reissuance. Please note that, for the 2012 permit the $cBOD_5$ and TSS loading limitations are expressed as 91 kg/d rather than the previous 90 kg/d due to implementation of rounding procedures described in GM06-2016. Since this a change to the expression of the limitations rather than the limitations themselves, antibacksliding policies are maintained.

19. Special Conditions:

Part I.B. – Whole Effluent Toxicity (WET) Testing:
Rationale: VPDES Permit Regulation, 9 VAC 25-31-210 and 220 I, requires monitoring in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act.

Part I.C

a. Special Condition C.1 – 95% Capacity Reopener

Rationale: Required by VPDES Permit Regulation, 9 VAC 25-31-200 B 4 for all POTW and PVOTW permits.

b. Special Condition C.2—Indirect Dischargers
Rationale: Required by VPDES Permit Regulation, 9 VAC 25-31-200 B.1 & B.2 for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

c. Special Condition C.3 – CTC, CTO Requirement
Rationale: Required by Code of Virginia § 62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790-50.

d. Special Condition C.4 – Operations and Maintenance Manual Requirement
Rationale: Required by Code of Virginia §62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790; VPDES Permit Regulation, 9 VAC 25-31-190 E.

e. Special Condition C.5 – Licensed Operator Requirement
Rationale: The VPDES Permit Regulation, 9 VAC 25-31-200 C and the Code of Virginia § 54.1-2300 et seq., Rules and Regulations for Waterworks and Wastewater Works Operators and Onsite Sewage System Professionals (18 VAC 160-20-10 et seq.), require licensure of operators.

f. Special Condition C.6. – Reliability Class
Rationale: Required by Sewage Collection and Treatment Regulations, 9 VAC 25-790 for all municipal facilities.

g. Special Condition C.7. – Sludge Reopener
Rationale: Required by VPDES Permit Regulation 9 VAC 25-31-220 C for all permits issued to treatment works treating domestic sewage.

h. Special Condition C.8 – Total Maximum Daily Load (TMDL) Reopener
Rationale: Section 303(d) of the Clean Water Act requires that Total Maximum Daily Loads (TMDLs) be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it into compliance with any applicable TMDL approved for the receiving stream. The re-opener recognizes that, according to Section 402(o)(1) of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in this permit. Specifically, they can be relaxed if they are the result of a TMDL, basin plan, or other wasteload allocation prepared under section 303 of the Act.

i. Special Condition C.9 – Compliance Reporting
Rationale: Authorized by VPDES Permit Regulation, 9 VAC 25-31-190 J 4 and 220 I. This condition is necessary when pollutants are monitored by the permittee and a maximum level of quantification and/or a specific analytical method is required in order to assess compliance with a permit limitation or to compare effluent quality with a numeric criterion. The condition also establishes protocols for calculation of reported values.

j. Special Condition C.10 – Sludge Use and Disposal
Rationale: VPDES Permit Regulation, 9 VAC 25-31-100 P; 220 B 2, and 420 through 720; and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on sludge use and disposal practices and to meet specified standards for sludge use and disposal.

k. Special Condition C.11 – Materials Handling and Storage
Rationale: 9 VAC 25-31-50 A prohibits the discharge of any wastes into State waters unless authorized by permit. Code of Virginia §62.1-44.16 and 62.1-44.17 authorizes the Board to regulate the discharge of industrial waste or other waste.

l. Special Condition C.12 - Treatment Works Closure Plan

Rationale: §62.1-44.19 of the State Water Control Law. This condition establishes the requirement to submit a closure plan for the wastewater treatment facility if the treatment facility is being replaced or is expected to close.

m. Special Condition C.13 – Effluent Monitoring Frequencies
Rationale: Permittees are granted a reduction in monitoring frequency based on a history of permit compliance. To remain eligible for the reduction, the permittee should not have violations related to the effluent limits for which reduced frequencies were granted. If permittees fail to maintain the previous level of performance, the baseline monitoring frequencies should be reinstated for those parameters that were previously granted a monitoring frequency reduction.

n. Special Condition C.14 - Pretreatment
Rationale: VPDES Permit Regulation, 9VAC25-31-730 through 900, and 40 CFR Part 403 require certain existing and new sources of pollution to meet specified regulations.

20. Part II, Conditions Applicable to All VPDES Permits
The VPDES Permit Regulation at 9 VAC 25-31-190 requires all VPDES permits to contain or specifically cite the conditions listed.

21. Changes to 2007 Permit: The tables on the following pages represent a summary of the limitations and monitoring requirements changes from the 2007 permit to the 2012 permit reissuance.

(continued on next page . . .)

Table 5: Changes to Limitations and Monitoring (Part I.A.)

EFFLUENT CHARACTERISTICS		DISCHARGE LIMITATIONS										MONITORING REQUIREMENTS				REASON FOR CHANGE
		MONTHLY AVERAGE				WEEKLY AVERAGE				MINIMUM		MAXIMUM		FREQUENCY		SAMPLE TYPE		
		From		To		From		To		From	To	From	To	From	To	From	To	
Flow (MGD)		NL		No Change		NA		No Change		NA	No Change	NL	No Change	Continuous	No Change	Totalizing, Indicating, and Recording	No Change	No Changes
pH		NA		No Change		NA		No Change		6.0 SU	No Change	9.0 SU	No Change	1/Day	1 per Day	Grab	No Change	Expression of monitoring frequency changed according to regional preference.
$cBOD_5$	Jan-Apr	20 mg/L	90 kg/d	No Change	91 kg/d	30 mg/L	140 kg/d	No Change	No Change	NA	No Change	NA	No Change	1/Week	2 Days per Week	24 HC	24 Hour Composite	Expression of monthly loading limit revised to reflect proper rounding conventions. Monitoring frequency changed to reflect monitoring reduction analysis. Expression of monitoring frequency and sample type changed according to regional preference.
	May-Dec	10 mg/L	45 kg/d	No Change	No Change	15 mg/L	68 kg/d	No Change	No Change	NA	No Change	NA	No Change	1/Week	2 Days per Week	24 HC	24 Hour Composite	
Total Suspended Solids (TSS)		20 mg/L	90 kg/d	No Change	91 kg/d	30 mg/L	140 kg/d	No Change	No Change	NA	No Change	NA	No Change	1/Month	1 per Month	24 HC	24 Hour Composite	
Ammonia as N	Jan-Apr	13.5 mg/L		No Change		NA		13.5 mg/L		NA	No Change	13.5 mg/L	Removed	1/Month	1 per Month	Grab	24 Hour Composite	Maximum limitation changed to weekly limitation in accordance with GM00-2011 (Pg. 70). Expression of monitoring frequency changed according to regional preference. 24 Hour composite sampling required in accordance with GM10-2003 (MN-2, Pg.2)
Total Kjeldahl Nitrogen (TKN)	May-Dec	3.0 mg/L	14 kg/d	No Change	No Change	4.5 mg/L	20 kg/d	No Change	No Change	NA	No Change	NA	No Change	3D/Week	2 Days per Week	24 HC	24 Hour Composite	Monitoring frequency changed to reflect monitoring reduction analysis. Expressions of monitoring frequency and sample type changed according to regional preference.
Dissolved Oxygen (DO)	Jan-Apr	NA		No Change		NA		No Change		5.0 mg/L	No Change	NA	No Change	1/Day	1 per Day	Grab	No Change	Expression of monitoring frequency changed according to regional preference.
	May-Dec	NA		No Change		NA		No Change		6.5 mg/L	No Change	NA	No Change	1/Day	1 per Day	Grab	No Change	
E.Coli		126 N / 100 mL (Geometric Mean)		No Change		NA		No Change		NA	No Change	NL	No Change	5D/Week 10 a.m.-4 p.m.	5 Days per Week (between 10 am and 4 pm)	Grab	No Change	Expression of monitoring frequency changed according to regional preference. Please note that this limitation replaces the 2007 permit's fecal coliform limitation. Please see Table 6 of this fact sheet for further information.
Zinc, Total Recoverable		0.075 mg/L		61 µg/L		0.075 mg/L		61 µg/L		NA	No Change	NA	No Change	1/6 Months	1 per Three Months	Grab	No Change	See Item 16 of this fact sheet for information regarding the new Zinc limitation. Monitoring frequency changed to reflect monitoring reduction analysis. Expression of monitoring frequency changed according to regional preference. Limitation changed to be expressed in micrograms per liter for clarity purposes.
Chronic 7-Day Static Renewal Survival and Growth Test: [*Pimephales promelas*]		NA		No Change		NA		No Change		NA	No Change	1.9 TUc		1/ 3 Months	1 per Three Months	24 HC	24 Hour Composite	Expressions of monitoring frequency and sample type changed according to regional preference.

Table 6: Other Changes to 2007 Permit

From	To	Permit Section Changed	Reason for Change	Date
Part I.A.1	Part I.A.1	Authorization statement	Language revised to reflect GM10-2003 (MN-1, Pg 15).	
Part I.A.1 **	Part I.A.1(a)	Design flow footnote	95% Capacity Reopener reference added for clarity.	4/12
Part I.A.1 *	Part I.A.1(b)	Significant figures footnote	"Digits" replaced with "figures" to match vocabulary used in GM06-2016.	
Part I.A.1 ‡	Part I.A.1(c)	WET Requirements	Revised to remove compliance schedule reference ,and to address change in permit structure.	
Part I.A.2	Part I.A.2	No discharge floating solids/foam	No Change	
--	Part I.A.3	85% removal BOD_5 & TSS	New, added in accordance with GM10-2003 (MN-1, Pg. 15) and Federal Effluent Guidelines.	
Part 1.A.3	Part I.A.4	Sample location	Changed required compliance point for final effluent from 'Outfall 001' to 'after post aeration' due to Outfall 001 being partially submerged in Roses Creek during high flow events.	
--	Part I.A.5	Monitoring frequency schedule	New, added to clarify monitoring and reporting schedule for frequencies less than once per month.	
Part I.B.2	Part I.B	Whole Effluent Toxicity Requirements	Compliance schedule and additional chronic monitoring for C.dubia removed. Language revised in accordance with recommendations from OWP&CA.	
Part I.C.1	Part I.C.1	95% Capacity Notification	No Change	
Part I.C.2	Part I.C.2	Indirect Dischargers	Structure changed to match agency boilerplate contained in GM10-2003 (MN-3, Pg.4)	
Part I.C.3	Part I.C.3	CTC, CTO Requirement	Revised wording to reflect GM10-2003 (MN-3, Pg.4)	
Part I.C.4	Part I.C.4	O & M Manual	Revised to reflect 4/3/2012 boilerplate developed by OWP&CA.	
Part I.C.5	Part I.C.5	Licensed Operator	Revised to reflect Board name change in DPOR regulations.	
Part I.C.6	Part I.C.6	Reliability Class	No Change	
Part I.C.7	Part I.C.7	Sludge Reopener	No Change	
Part I.C.8	Part I.C.8	TMDL Reopener	No Change	
Part I.C.9	Part I.C.9	Compliance Reporting	Revised to reflect current agency guidance (GM10-2003, MN-3,Pg.14). Language further revised according to regional procedure and for clarity purposes. $cBOD_5$ QL revised from 5 mg/L to 2 mg/L for consistency with recently adopted VPDES General Permit regulations. QL for Zinc revised to reflect current target value in accordance with agency guidance.	
Part I.C.10	Part I.C.10	Sludge Use and Disposal	Revised to remove reference to the Virginia Department of Health in accordance with GM10-2003 (MN-3, Pg.16)	
Part I.C.12	Part I.C.11	Materials Handling/Storage	Revised to reflect current agency boilerplate contained in GM10-2003 (IN-3, Pg.6).	
--	Part I.C.12	Treatment Works Closure Plan	New, reflects SCAT regulations requirements (9 VAC 25-790-120 E.)	
Part I.C.13	Part I.C.13	Effluent Monitoring Frequencies	Wording and structure enhanced for clarity.	
Part I.C.11	Part I.C.14	Pretreatment	Language revised in accordance with regional preference.	
--	Part II.A.4	VELAP requirements	New, incorporated to reflect change in laboratory accreditation requirementsand in accordance with GM10-2003	
Part I.B.1	Removed	E.coli Compliance Schedule / Demonstration Study	The permittee successfully completed the E.coli demonstration study, and consequently, the E.coli limitation replaced the former Fecal Coliform limitation on April 15, 2008.	

From	To	Permit Section Changed	Reason for Change	Date
Part I.C.14	Removed	Water Quality Criteria Monitoring	This special condition was exclusive to the 2007 permit cycle and no longer applies.	
Expiration date of permit has been shortened from an exact 5 year expiration in order for the next permit term to begin with a complete calendar month. The structure and language of the cover page have been slightly modified in accordance with new agency procedures and for streamlining purposes. Facility name changed to remove 'STP' and replace with "Wastewater Treatment Plant (WWTP)" to match 2012 permit application. Facility location address revised to include city, state, and zip code. Outfall number added to cover page. Signatory changed to reflect Deputy Regional Director.				

22. Variances/Alternate Limits or Conditions: None.

23. Regulation of Users: 9VAC25-31-280 B 9: There are no industrial users contributing to the treatment works. During the 2007 permit cycle, a significant industrial user was identified by the permittee as discharging to the permittee's conveyance system, and the user was consequently placed into DEQ's pretreatment inspection program. However, in 2009 the user disconnected from the system, and an inspection was performed by DEQ staff (accompanied by the permittee) on January 28, 2010 which confirmed that the user no longer had the capability to discharge to the conveyance system.

24. Public Notice Information required by 9 VAC 25-31-280 B:

Comment period: Start Date: TBD End Date: TBD
Published Dates: TBD
Name of Newpaper: *Brunswick Times Gazette*

All pertinent information is on file and may be inspected or copied by contacting Jeremy Kazio at:

Virginia Department of Environmental Quality (DEQ)
Piedmont Regional Office
4949-A Cox Road
Glen Allen, Virginia 23060-6296

Telephone Number 804/527-5044
Facsimile Number 804/527-5106
Email Jeremy.Kazio@deq.virginia.gov

DEQ accepts comments and requests for public hearing by e-mail, fax or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all persons represented by the commenter/requester. A request for public hearing must also include: 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit with suggested revisions. A public hearing may be held, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the permit. The public may review the draft permit and application at the DEQ Piedmont Regional Office by appointment.

25. 303(d) Impaired Waters / Total Maximum Daily Load (TMDL):

During the 2010 305(b)/303(d) Integrated Water Quality Assessment, Roses Creek from the Alberta STP to its mouth was considered a Category 4A waterbody ("Impaired or threatened for one or more designated uses but does not require a TMDL because the TMDL for specific

pollutant(s) is complete and US EPA approved.") The Recreation Use was impaired due to E. coli exceedances. The Aquatic Life Use and Wildlife Use were assessed as fully supporting. The Fish Consumption Use was not assessed.

The Roses Creek Bacterial TMDL was approved by the EPA on 7/6/2004 and by the SWCB on 12/2/2004. The Town of Lawrenceville WWTP was inadvertently excluded from the original TMDL, but the TMDL was subsequently modified on 7/17/2007 to add the facility. The Lawrenceville WWTP received an E. coli wasteload allocation of 4.18E+12 cfu/year based on the current design flow of 1.2 MGD plus an additional 1.2 MGD of future growth, if needed.

The 2012 permit has a limitation for E.coli of 126 N /100 mL that is in compliance with the Roses Creek Bacterial TMDL (see Item 16 of this fact sheet).

26. Additional Comments:

a. Previous Board Action: None

b. Staff Comments:

- *Monitoring Frequency Reduction*: A monitoring frequency reduction evaluation was conducted for this facility in accordance with GM10-2003 (MN-2, Pg.2). This evaluation is included as part of the DMR data summary in **Attachment F**. Between April 2009 and April 2012 the permittee was issued one Warning Letter dated 10/29/2010 for not transcribing the WET results he submitted with his DMR onto the DMR itself. The permittee promptly resubmitted the DMR with the correct information. Considering that this does not represent an infraction related to the performance of the wastewater treatment plant, it is staff's judgment that monitoring frequency reductions are appropriate for the 2012 permit reissuance.

- *Storm Water Requirements:* This facility is not required to register for coverage under 9 VAC 25-151 General VPDES Permit VAR05 for Discharges of Storm Water Associated with Industrial Activity (Sector T) due the issuance of No Exposure Certification on May 23, 2012. Refer to **Attachment I** for the NEC application, inspection, and approval letter.

- *Financial Assurance*: Financial Assurance obligations do not apply to this facility because it is publicly owned.

- *VDH-Office of Drinking Water:* Coordination with the Virginia Department of Health - Office of Drinking Water indicated that there are no public water supply intakes within 15 miles downstream of the discharge (see **Attachment J**).

- *Department of Game and Inland Fisheries-Threatened/Endangered Species Screening (T&E)*: A T&E species screening was conducted using VDGIF's Fish and Wildlife Information Service for aquatic species. The Green Floater and Atlantic Pigtoe, listed as state threatened and federal species of concern, respectively, were confirmed within a two mile radius of the outfall. Formal coordination with DGIF was initiated on 4/23/2012. A written response was received on June 5, 2012 recommending the following:

  a) That ultraviolet (UV) disinfection be used rather than chlorination,
  b) That DEQ should coordinate with the VA Dept. of Conservation and Resources and the US Fish and Wildlife Service on the 2012 permit action due to the presence of the abovementioned T&E species located within 2 miles of the discharge, and
  c) That EPA's 2009 proposed Ammonia criteria be used to derive the 2012 permit Ammonia limitations.

With regard to DGIF's first comment, this facility already utilizes UV disinfection. In response to the second comment, coordination with DCR and USFWS was initiated on June 6, 2012. The USFWS responded on June 28, 2012 stating that "there are not federally listed species or designated critical habitat in the area and therefore no impacts to federally listed species are anticipated." The DCR responded on

For Ammonia, DEQ used the Virginia Water Quality Standards (effective January 6, 2011) adopted by the State Water Control Board and approved by EPA to determine VPDES effluent limitations that are protective of human health and the environment. These standards are updated on a regular basis (triennial review) to incorporate new information applicable to Virginia. The reasonable potential analysis discussed in section 16 above was conducted based on these current Virginia Water Quality Standards. Existing ammonia criteria are established to meet the requirement of 9VAC25-260-20.A that "State waters be free from substances attributable to sewage in concentrations, amounts, or combinations which…are inimical or harmful to human, animal, plant, or aquatic life." DEQ has informed DGIF that their comments concerning EPA 2009 draft ammonia criteria can be properly addressed as part of the Water Quality Standards triennial review process. Following that regular review process, any adopted revisions to the Virginia Water Quality Standards regulation are then included in future permit actions.

DEQ believes that effluent discharge from this facility meets the requirements of the Water Quality Standards and the VPDES permit regulation and does not violate either the federal Endangered Species Act or the Virginia Endangered Species Act. (see **Attachment J**)

- *Planning Concurrence:* The discharge is in conformance with the existing planning documents for the area.

- *EPA Comments*: The draft permit was sent to EPA on June 13, 2012. EPA responded on June 28, 2012 stating that they had no comments. Please see **Attachment L** for EPA's full response.

- *Permit Fees*: The permittee last paid their annual maintenance fee on 9/19/2011 and is considered current.

- *VEEP Status:* The permittee is not a participant in the Virginia Environmental Excellence Program (VEEP).

- *E-DMR Status*: The permittee is currently an e-DMR participant.

- *Chesapeake Bay Nutrients*: The facility is not required to register for coverage under 9 VAC 25-820-10 et seq.- General VPDES Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia. The facility does not discharge into the Chesapeake Bay Watershed and consequently is not listed in the Chesapeake Bay TMDL.

- *Local Government Notification of Public Notice:* A copy of the public notice for the 2012 permit reissuance was mailed to the Southside Regional Planning District Commission, the Town Manager, and the Town Mayor on ----------. No comments regarding the permit action were received.

- This permit reissuance is non-controversial. The staff believes that the attached effluent limitations will maintain the Water Quality Standards adopted by the Board.

c. Public Comments: TBD

27. Summary of attachments to this Fact Sheet:

Attachment A	Flow Frequency Memo, Flow Interpolation, 303(d) Fact Sheet
Attachment B	Topographic Map, Aerial Photo, Facility Flow Diagram
Attachment C	Sludge Process Description, Sludge Haul Map
Attachment D	Receiving Stream Information and Stream Model
Attachment E	Facility Inspection Report
Attachment F	Effluent Information
Attachment G	Effluent Screening and Limitation Evaluations
Attachment H	Whole Effluent Toxicity Data and Limitation Evaluation
Attachment I	No Exposure Certification Information
Attachment J	VDH-ODW Concurrence and T&E Coordination
Attachment K	2012 Application Waiver Requests and DEQ Approvals
Attachment L	EPA Review

Attachment A

Flow Frequency Memo, Flow Interpolation, 303(d) Fact Sheet

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office
4949-A Cox Road Glen Allen, Virginia 23060

SUBJECT: Flow Frequency Determination / 303(d) Status
Town of Lawrenceville WWTP – VA0020354

TO: Jeremy Kazio

FROM: Jennifer Palmore, P.G.

DATE: April 12, 2012

COPIES: Modeling File

The Town of Lawrenceville WWTP discharges to Roses Creek in Brunswick County. The outfall is located at rivermile 5ARSE000.28. Stream flow frequencies are required at this site for use by the permit writer in developing effluent limitations for the VPDES permit.

During the years 2002-2003, ten streamflow measurements were made on Roses Creek at the Route 58 bridge (#02051715), which is approximately 0.2 mile upstream of the discharge. The measurements were correlated with the same-day daily mean flows at the continuous record gage on the Meherrin River near Lawrenceville (#02051500), which has been operated since 1928. The measurements and daily mean values were plotted on a logarithmic graph and a best-fit power trend line was plotted through the data points. The required flow frequencies from the reference gage were plugged into the equation for the regression line to calculate the associated flow frequencies at the measurement site on Roses Creek. There is strong confidence in the regression analysis because a very good correlation was obtained and several of the streamflow measurements on the Meherrin River were obtained during low flow conditions that were below its 7Q10. Due to the proximity between the measuring point at Route 58 and the discharge point, the flow frequencies from the measuring site are assumed to be equal. The flows are listed below.

Meherrin River near Lawrenceville, VA (#02051500)
Drainage Area - 552 mi^2
Statistical period - 1928-2003
High Flow Months – January to April

1Q30 = 6.0 cfs	High Flow 1Q10 = 90 cfs
1Q10 = 12 cfs	High Flow 7Q10 = 116 cfs
7Q10 = 14 cfs	High Flow 30Q10 = 172 cfs
30Q10 = 23 cfs	HM = 131 cfs
30Q5 = 35 cfs	

Roses Creek at Route 58, at Lawrenceville, VA (#02051715)
Drainage Area - 27.3 mi^2

1Q30 = 0.237 cfs (0.153 MGD)	High Flow 1Q10 = 4.05 cfs (2.62 MGD)
1Q10 = 0.490 cfs (0.317 MGD)	High Flow 7Q10 = 5.29 cfs (3.42 MGD)
7Q10 = 0.576 cfs (0.372 MGD)	High Flow 30Q10 = 7.99 cfs (5.17 MGD)
30Q10 = 0.969 cfs (0.626 MGD)	HM = 6.01 cfs (3.88 MGD)
30Q5 = 1.51 cfs (0.973 MGD)	

This analysis does not address any withdrawals, discharges, or springs influencing the flow between the measurement site and discharge point.

The flows listed above are based upon current conditions and are influenced by the discharge from the Town of Alberta STP. If the Alberta STP discharge were to shut down, the flows in Roses Creek would

reduce slightly. To calculate the flow frequencies, the flow values collected at the measurement site were reduced by the amount that the Alberta STP discharged on each specific day (as reported in the facility's DMRs). The regression and flow frequencies were then calculated as described above. The expected flow frequencies if the influence from Alberta STP were to be removed are as follows:

Roses Creek at Route 58, at Lawrenceville, VA (#02051715)

Drainage Area - 27.3 mi^2

1Q30 = 0.210 cfs (0.136 MGD)	High Flow 1Q10 = 3.89 cfs (2.51 MGD)
1Q10 = 0.443 cfs (0.286 MGD)	High Flow 7Q10 = 5.11 cfs (3.31 MGD)
7Q10 = 0.523 cfs (0.338 MGD)	High Flow 30Q10 = 7.82 cfs (5.05 MGD)
30Q10 = 0.893 cfs (0.577 MGD)	HM = 5.83 cfs (3.77 MGD)
30Q5 = 1.41 cfs (0.908 MGD)	

Roses Creek has historically been considered a Tier 1 water and antidegradation was not applied during the 1979 and 1996 modeling efforts. Both models indicate dissolved oxygen levels will fall to or below 5.0 mg/L during critical conditions.

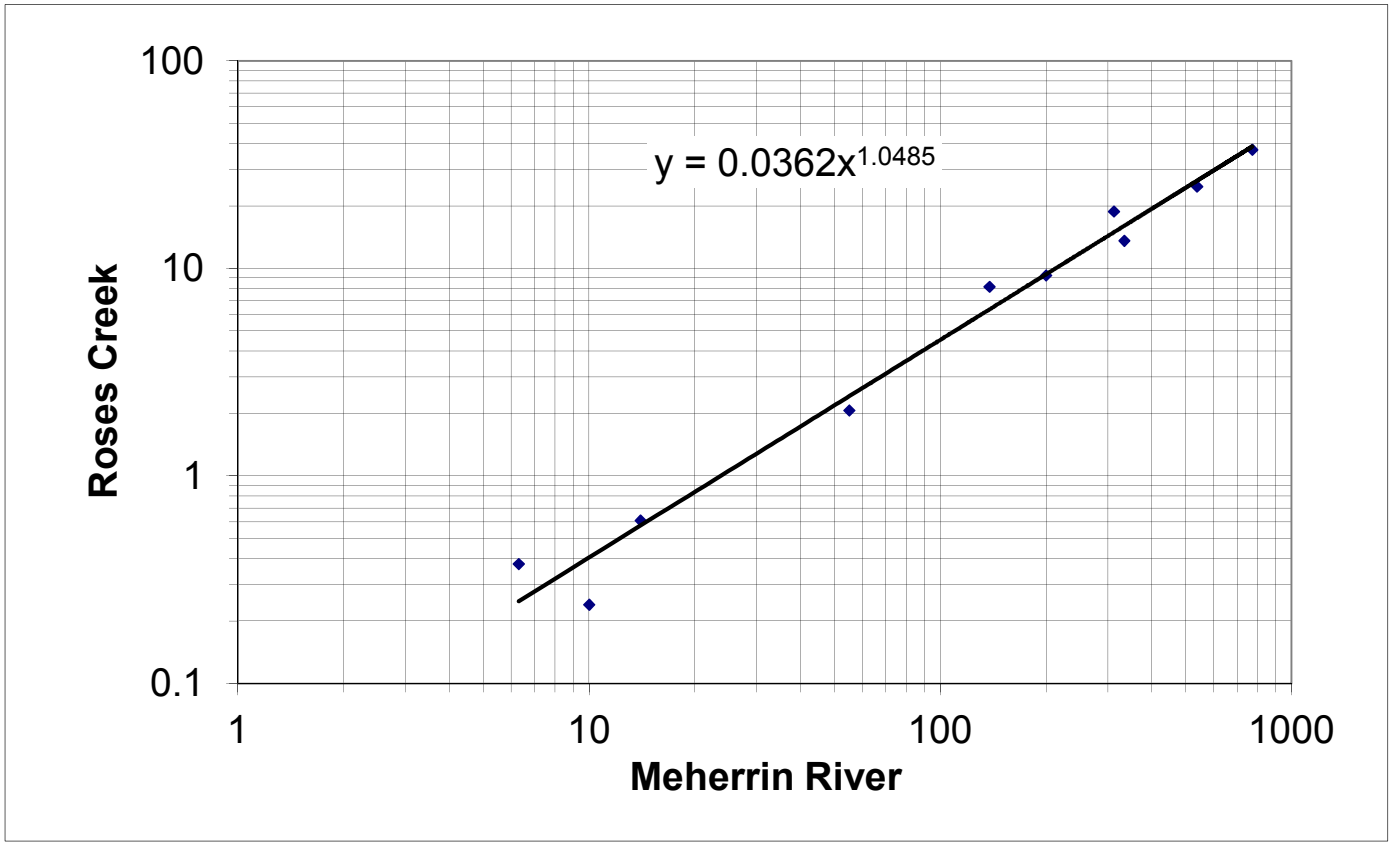
Water quality data from monitoring station 5ARSE001.22 is attached. The station is located on Roses Creek at the Route 678 bridge and is approximately 1 mile upstream of the discharge.

During the 2010 305(b)/303(d) Integrated Water Quality Assessment, Roses Creek from the Alberta STP to its mouth was considered a Category 4A waterbody ("Impaired or threatened for one or more designated uses but does not require a TMDL because the TMDL for specific pollutant(s) is complete and US EPA approved.") The Recreation Use was impaired due to E. coli exceedances; the applicable fact sheet is attached. The Aquatic Life Use and Wildlife Use were assessed as fully supporting. The Fish Consumption Use was not assessed.

The Roses Creek Bacterial TMDL was approved by the EPA on 7/6/2004 and by the SWCB on 12/2/2004. The Town of Lawrenceville WWTP was inadvertently excluded from the original TMDL, but the TMDL was subsequently modified on 7/17/2007 to add the facility. The Lawrenceville WWTP received an E. coli wasteload allocation of 4.18E+12 cfu/year based on the current design flow of 1.2 MGD plus an additional 1.2 MGD of future growth, if needed.

If you have any questions, please let me know.

Roses Creek at Route 58 at Lawrenceville, VA (#02051715)
vs. Meherrin River near Lawrenceville, VA (#02051500)



Flow Data (cfs)

Date	Meherrin	Roses
4/16/2002	138	8.16
6/4/2002	55	2.07
7/17/2002	6.3	0.377
8/6/2002	10	0.240
10/7/2002	14	0.610
11/25/2002	200	9.25
3/11/2003	538	24.8
6/17/2003	773	37.3
8/19/2003	334	13.6
10/15/2003	312	18.8

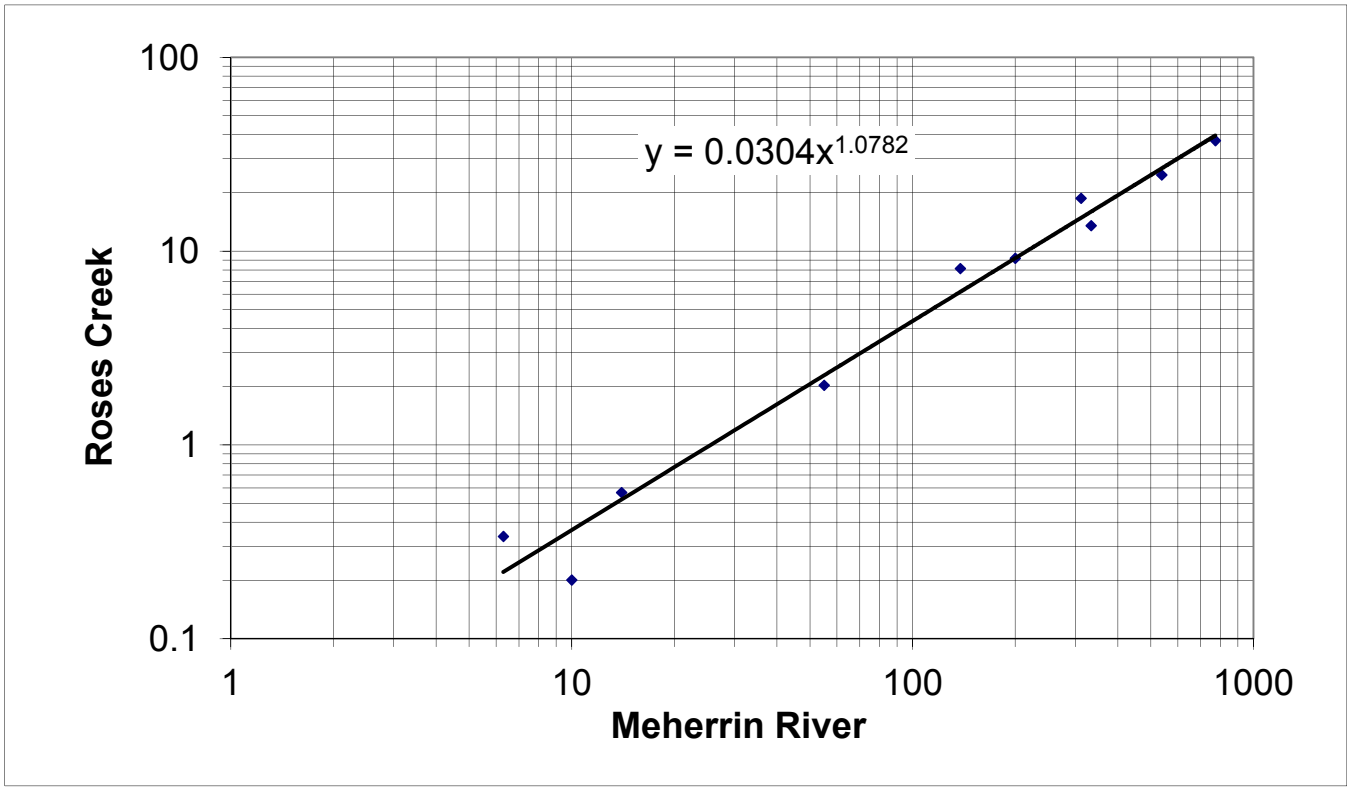
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.991
R Square	0.982
Adjusted R Square	0.980
Standard Error	1.746
Observations	10

Flow Frequencies

Meherrin (cfs)		Roses (cfs)	Roses (MGD)
6.0	1Q30	0.237	0.153
12	1Q10	0.490	0.317
14	7Q10	0.576	0.372
23	30Q10	0.969	0.626
35	30Q5	1.51	0.973
90	HF 1Q10	4.05	2.62
116	HF 7Q10	5.29	3.42
172	HF 30Q10	7.99	5.17
131	HM	6.01	3.88
552	DA (mi^2)	27.3	
	Jan-Apr		

Roses Creek at Route 58 at Lawrenceville, VA (#02051715)
vs. Meherrin River near Lawrenceville, VA (#02051500)



Flow Data (cfs)

Date	Meherrin	Roses	Roses - STP
4/16/2002	138	8.16	8.13
6/4/2002	55	2.07	2.03
7/17/2002	6.3	0.377	0.338
8/6/2002	10	0.240	0.201
10/7/2002	14	0.610	0.569
11/25/2002	200	9.25	9.19
3/11/2003	538	24.8	24.7
6/17/2003	773	37.3	37.2
8/19/2003	334	13.6	13.5
10/15/2003	312	18.8	18.7

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.991
R Square	0.982
Adjusted R Square	0.980
Standard Error	1.748
Observations	10

Flow Frequencies

Meherrin (cfs)		Roses (cfs)	Roses (MGD)
6.0	1Q30	0.210	0.136
12	1Q10	0.443	0.286
14	7Q10	0.523	0.338
23	30Q10	0.893	0.577
35	30Q5	1.41	0.908
90	HF 1Q10	3.89	2.51
116	HF 7Q10	5.11	3.31
172	HF 30Q10	7.82	5.05
131	HM	5.83	3.77
552	DA (mi^2)	27.3	
	Jan-Apr		

Date	STP flow (MGD)	STP flow (cfs)
4/16/2002	0.0168	0.0260
6/4/2002	0.0238	0.0368
7/17/2002	0.0255	0.0395
8/6/2002	0.0251	0.0388
10/7/2002	0.0267	0.0413
11/25/2002	0.0364	0.0563
3/11/2003	0.0414	0.0641
6/17/2003	0.0634	0.0981
8/19/2003	0.0354	0.0548
10/15/2003	0.0331	0.0512

2010 Fact Sheets for 303(d) Waters

RIVER BASIN: Chowan River and Dismal Swamp Basins **HYDROLOGIC UNIT:** 03010204

STREAM NAME: **Roses Creek**

TMDL ID: **K07R-02-BAC** **2010 IMPAIRED AREA ID:** VAP-K07R-02

ASSESSMENT CATEGORY: 4A **TMDL DUE DATE:** 2004

IMPAIRED SIZE: 9.85 - Miles **Watershed:** VAP-K07R

INITIAL LISTING: 1996

UPSTREAM LIMIT: Town of Alberta STP discharge

DOWNSTREAM LIMIT: Great Creek confluence

From the Alberta Sewage Treatment Plant discharge to the mouth at Great Creek.

CLEAN WATER ACT GOAL AND USE SUPPORT:

Recreation Use - Not Supporting

IMPAIRMENT: E. coli

Roses Creek from the Alberta STP discharge downstream to its mouth at Great Creek was previously evaluated as not supporting of the Recreation use support goal based on fecal coliform standard exceedances at the Route 678 bridge (5ARSE001.22). The TMDL was completed for E. coli and was adopted by the SWCB on 12/2/04.

During the 2010 cycle, the segment remained impaired with an E. coli exceedance rate of 13/33 at 5ARSE001.22 and 4/12 at 5ARSE000.23. The exceedance rate at 5ARSE006.68 was 1/12.

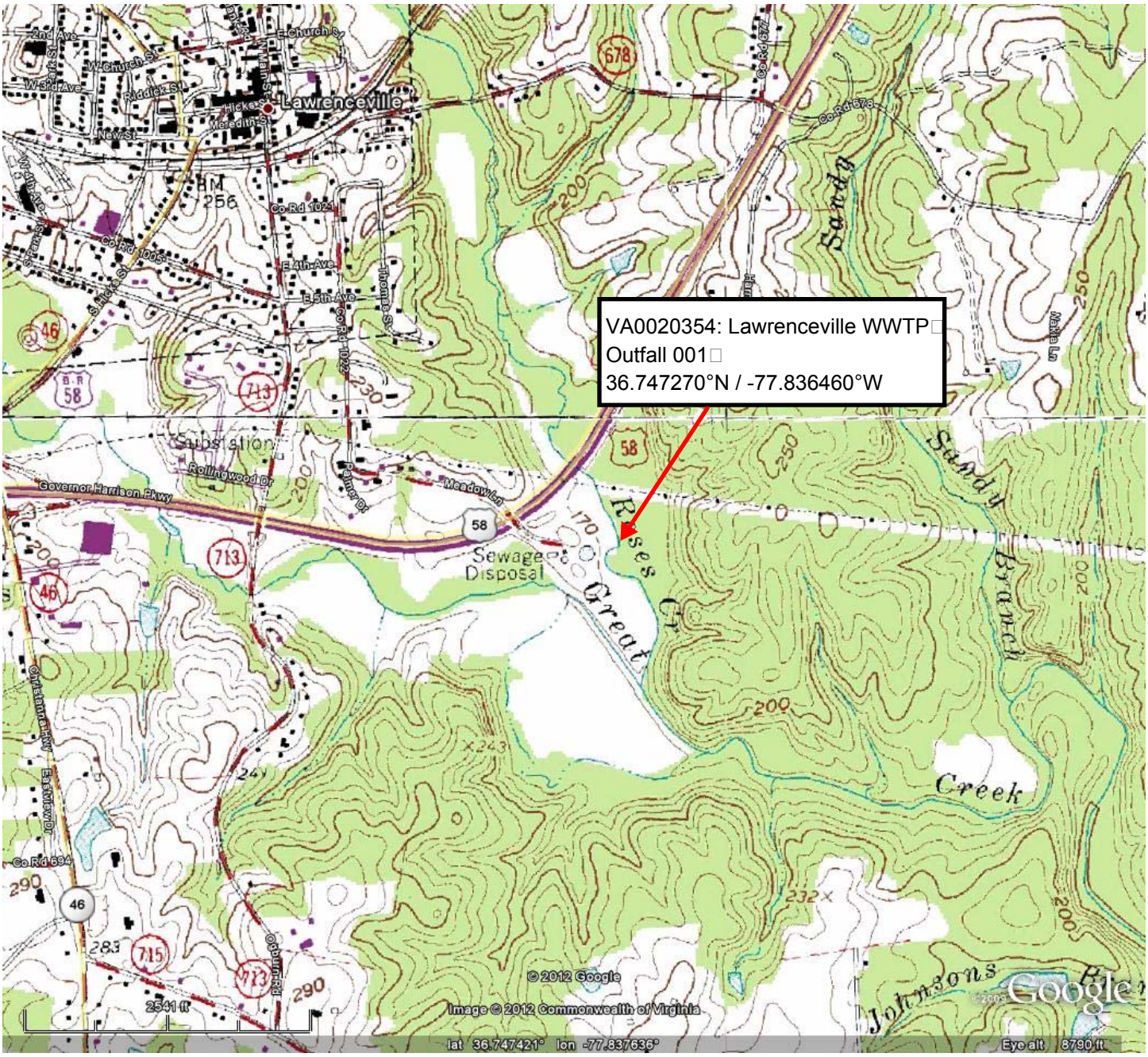
IMPAIRMENT SOURCE: Nonpoint Source, PS - Municipal

Allocations were given to both point and nonpoint sources.

RECOMMENDATION: Implementation

Attachment B

Topographic Map, Aerial Photo, Facility Flow Diagram


VA0020354: Lawrenceville WWTP
Outfall 001
36.747270°N / -77.836460°W
Lawrenceville
Substation
Sewage Disposal
Governor Harrison Pkwy
Great Creek
Sandy Branch Creek
Johnsons
© 2012 Google
Image © 2012 Commonwealth of Virginia
lat 36.747421° lon -77.837636°
Eye alt 8790 ft


VA0020354: Lawrenceville WWTP
Outfall 001
36.747270°N / -77.836460°W
58
Meadow Ln
© 2012 Google
Image © 2012 Commonwealth of Virginia
©2009 Google
419 ft
Imagery Date: Feb 1, 2007
lat 36.747421° lon -77.837636°
Eye alt 1449 ft

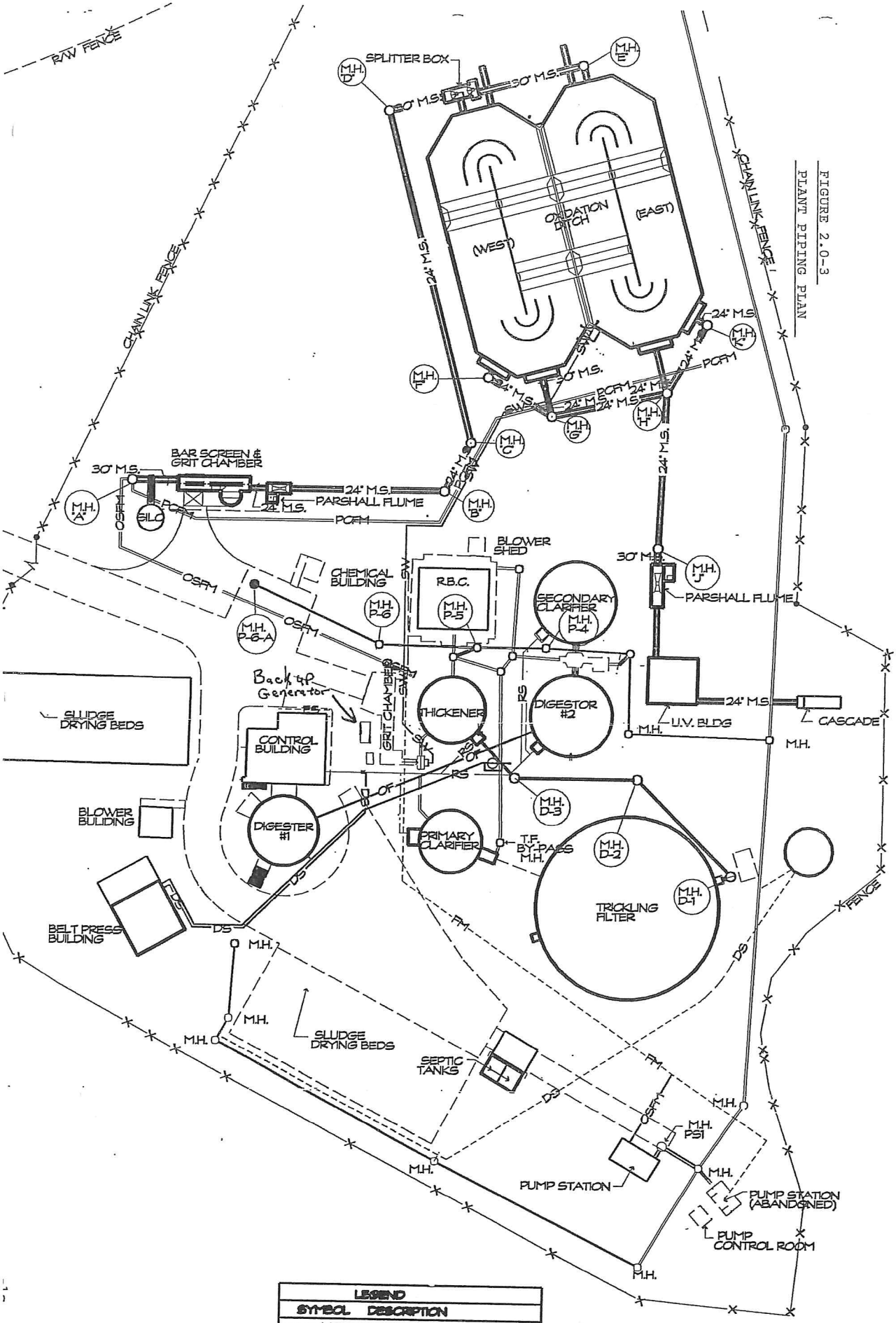
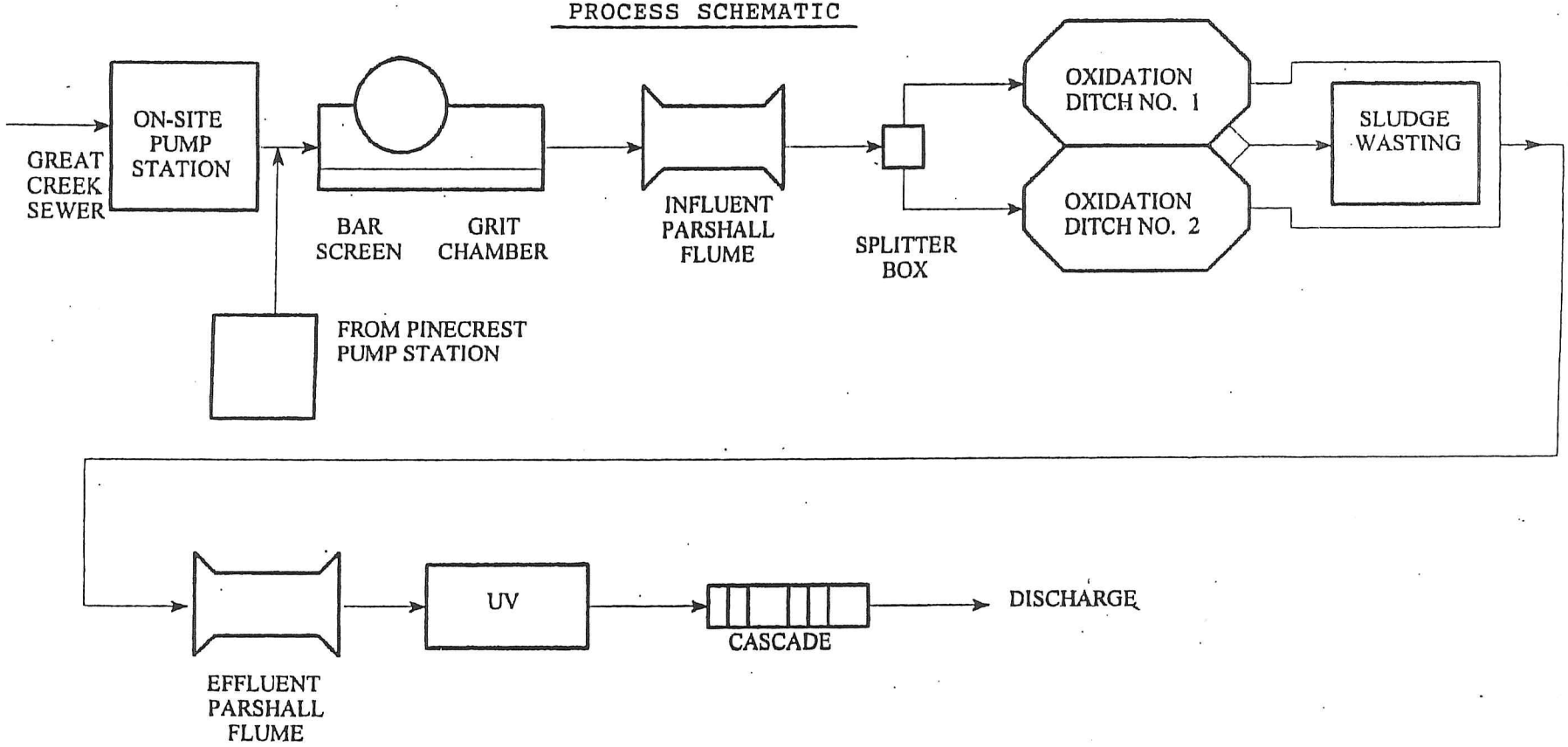


FIGURE 2.0-3

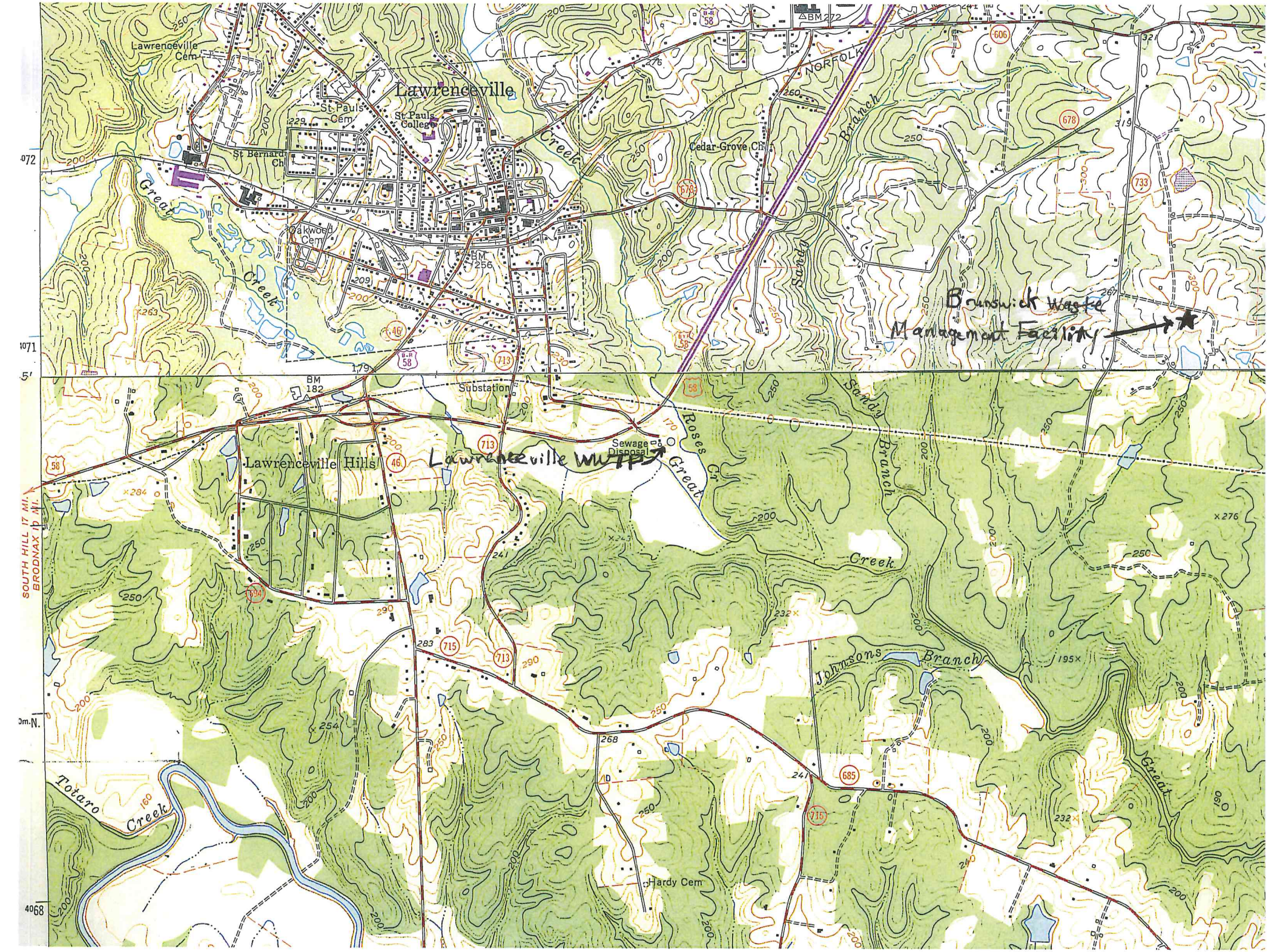
PLANT PIPING PLAN

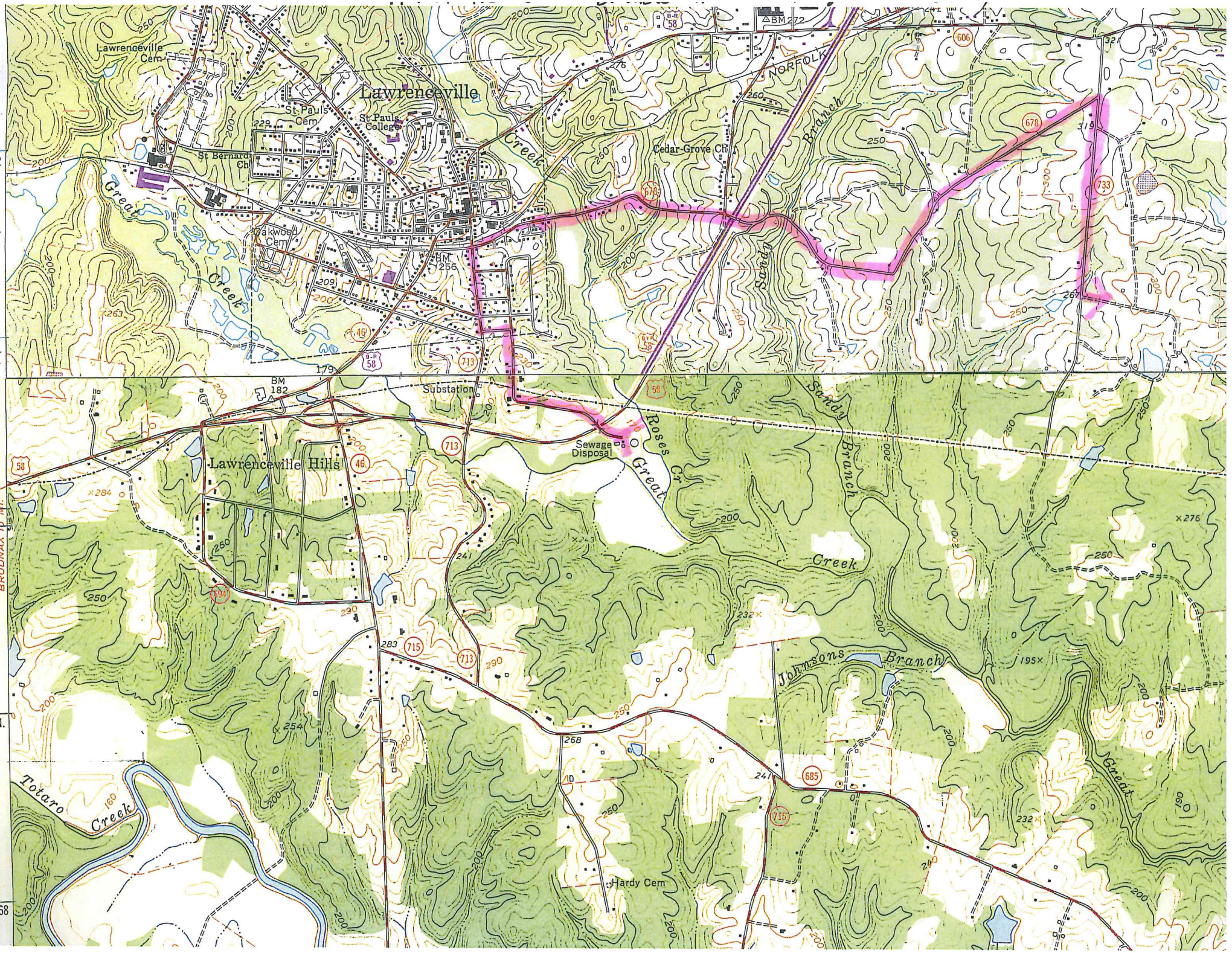
PROCESS SCHEMATIC

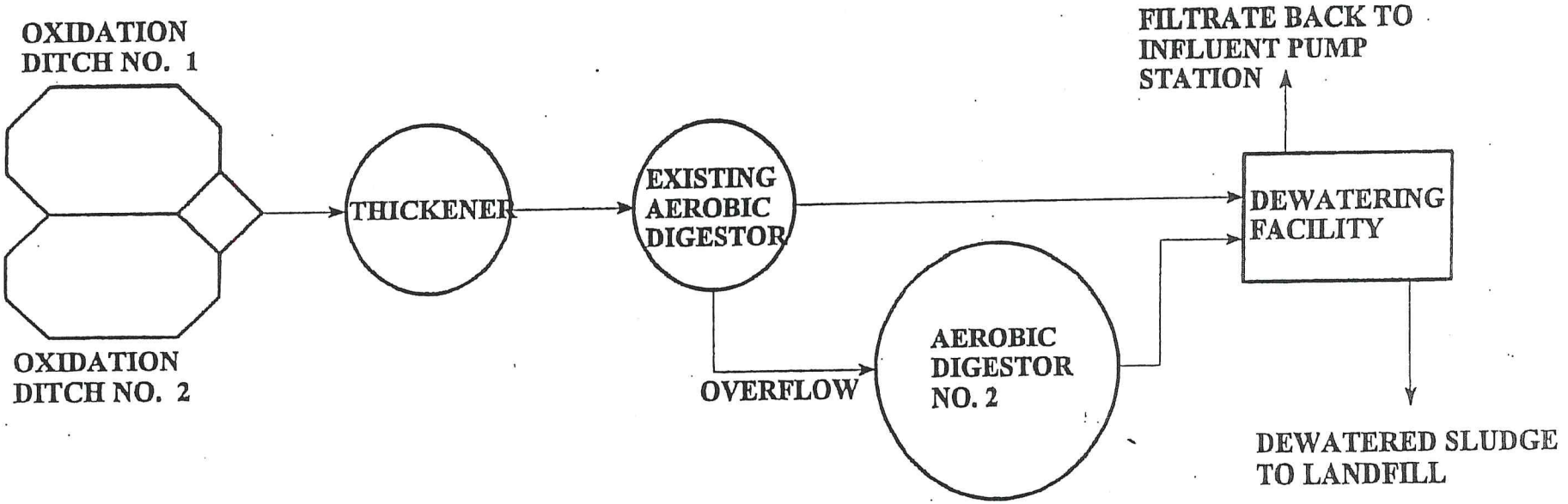


Attachment C

Sludge Process Description, Sludge Haul Map


Lawrenceville
Lawrenceville Cem
St Paul's Cem
St Paul's College
St Bernard Ch
Oakwood Cem
Great Creek
Cedar Grove Ch
Norfolk Sandy Branch
Brunswick Waste Management Facility
BM 182
Substation
Lawrenceville Hills
Lawrenceville WWTP
Sewage Disposal
Roses Cr
Great Creek
Sandy Branch
Johnsons Branch
Totaro Creek
Hardy Cem
SOUTH HILL 17 MI.
BRODNAX 10 MI.


Lawrenceville
Lawrenceville Cem
St. Pauls Cem
St. Pauls College
St Bernard Ch
Oakwood Cem
Great Creek
Cedar Grove Ch
Sandy Branch
NORFOLK
BM 256
BM 182
Substation
Roses Cr
Sewage Disposal
Lawrenceville Hills
Johnsons Branch
Totaro Creek
Hardy Cem
SOUTH HILL 17 MI.
BRODNAX 10 MI.



SLUDGE FLOWS

2.0.6 Sludge Handling system

The sludge handling system includes waste activated sludge (WAS) pumps, which are an integral part of the secondary treatment system). See Figure 2.0-8 -Sludge Handling System Layout for location of equipment.

The sludge wasting pumps convey the sludge to the thickener. Following thickening the sludge is routed to Digester No. 1 and then to Digester No. 2.

Sludge aeration in the aerobic digester helps support biological growth, removing nutrients and stabilizing the sludge. Mixing and oxygen requirements are met by surface aerators. Supernatant is decanted from the top tanks through telescopic valve arrangements and is returned to the head of the plant through the plant drain system for further processing.

Stabilized digested sludge is pumped to the dewatering building. Dewatered sludge is trucked to the Brunswick County Solid Waste Management facility, where it is land filled.

2.1 Raw Sewage Characteristics

Sewage flow-rates vary over a wide range depending on such things as time of day, infiltration and inflow, seasonal variations, etc. Influent flow rates at the plant can be expected

Attachment D

Receiving Stream Information and Stream Model

Roses Creek Ambient Water Quality Data - Monitoring Station 5ARSE001.22

2012 Permit Reissuance - Lawrenceville Wastewater Treatment Plant (VA0020354)

Collection Date	Sample Depth (meters)	Temperature (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Dissolved Oxygen - Winkler (mg/L)	Dissolved Oxygen - FTD Optical (mg/L)	Hardness (mg/L as CaCO3)	Ambient Temps-High Flow Months (°C)
7/13/1994	0.3	23.99	6.77	5.06			36	
10/19/1994	0.3	10.83	6.66	7.88			27	
1/11/1995	0.3	4.44	6.71	11.87			22	4.44
4/24/1995	0.3	12.72	6.78	7.72			32	12.72
7/26/1995	0.3	24.57	6.61	4.59			40	
10/30/1995	0.3	11.16	6.56	8.06			24	
1/23/1996	0.3	1.73	6.24	12.39			15	1.73
4/16/1996	0.3	16.33	6.65	9.36			21	16.33
7/8/1996	0.3	22.15	6.82	6.54			28	
10/2/1996	0.3	17.55	6.72	8.41			27	
1/6/1997	0.3	10.15	6.46	10.31			24	10.15
4/15/1997	0.3	10.73	6.88	9.73			24.3	10.73
9/18/1997	0.3	19.81	6.75	6.7			13.7	
11/24/1997	0.3	7.47	6.58	10.34			26	
1/28/1998	0.3	6.65	6.22	10.71			12.8	6.65
3/25/1998	0.3	8.01	6.58	11.28			10.7	8.01
5/21/1998	0.3	18.13	6.86	7.46			20	
7/30/1998	0.3	22.9	6.64	5.85			32	
9/24/1998	0.3	17.65	6.9	5.34			25.2	
11/19/1998	0.3	8.53	6.65	7.72			25.4	
1/21/1999	0.3	6.04	6.13	10.85			30	6.04
3/10/1999	0.3	4.28	6.78	12.59			40	4.28
5/19/1999	0.3	15.97	6.77	7.7			30	
7/22/1999	0.3	24.11	6.9	6.33			32.8	
9/15/1999	0.3	20	6.58	7.77			20.5	
11/3/1999	0.3	12.85	6.32	8.82				
1/19/2000	0.3	2.44	6.53	12.78			18.5	2.44
3/8/2000	0.3	10.02	6.62	10.44			17	10.02
5/8/2000	0.3	18.29	6.66	7.41			16	
6/29/2000	0.3	22.33	6.45	6.9			18.5	
9/6/2000	0.3	18.56	6.49	7.8			20.5	
10/13/2000	0.3	12.3	7.8	11				
11/29/2000	0.3	5.5	6.29	10.5	11		21.4	
2/1/2001	0.3	6.63	7.21	11.75			20.6	6.63
3/29/2001	0.3	7.29	6.87	11.18			22.9	7.29
3/18/2002	0.3	10.15	6.64	9.74				10.15
4/18/2002	0.3	21.62	6.77	7.39				21.62
5/7/2002	0.3	16.82	6.57	8.3				
7/2/2002	0.3	22.55	6.56	2.42			44.6	
7/30/2002	0.3	26.39	6.52	5.01				
9/5/2002	0.3	22.4	6.73	5.2				
10/29/2002	0.3	11.85	5.91	11.26				
11/25/2002	0.3	6.82	6.13	11.34				
12/10/2002	0.3	2.46	7.18	13.08				
1/13/2003	0.3	1.26	7	13.55				1.26
2/11/2003	0.3	3.16	6.76	14.2				3.16
3/11/2003	0.3	6.27	6.86	11.88				6.27
4/2/2003	0.3	11.83	6.5	10.23				11.83
4/21/2003	0.3	12.3	6.45	9.89				12.3
5/1/2003	0.3	18.8	6.49	8.84				
5/28/2003	0.3	15.91	6.4	8.94				
6/5/2003	0.3	18.6	6.63	9.9				
6/17/2003	0.3	19.19	6.31	8.49				
7/1/2003	0.3	21.63	6.62	7.53				
7/17/2003	0.3	22.53	6.95	7.25				
7/28/2003	0.3	22.87	7.09	7.02				

Roses Creek Ambient Water Quality Data - Monitoring Station 5ARSE001.22

2012 Permit Reissuance - Lawrenceville Wastewater Treatment Plant (VA0020354)

Collection Date	Sample Depth (meters)	Temperature (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Dissolved Oxygen - Winkler (mg/L)	Dissolved Oxygen - FTD Optical (mg/L)	Hardness (mg/L as CaCO3)	Ambient Temps-High Flow Months (°C)
8/5/2003	0.3	23.07	7.12	7.85				
8/19/2003	0.3	22.97	6.96	7.43				
9/23/2003	0.3	21.49	6.15	7.03				
10/20/2003	0.3	12.42	7.04	9.44				
11/19/2003	0.3	15.68	6.54	8.76				
12/10/2003	0.3	4.82	6.86	12.15				
5/23/2005	0.3	16.39	6.98	8.22			28	
7/12/2005	0.3	23.16	7.03	6.2			34	
11/21/2005	0.3	9.78	6.95	12.89			26	
1/25/2006	0.3	7.29	6.69	11.17			23	7.29
3/9/2006	0.3	8.6	7.3	12.1			24	8.6
5/23/2006	0.3	15.2	7	9.3			34	
7/24/2006	0.3	22.4	7.4	7.2			24	
9/20/2006	0.3	19.3	6.9	7.6			26	
11/30/2006	0.3	11.7	6.5	10.1			28	
1/7/2008	0.3	3.9	7.6			11.3		3.9
2/11/2008	0.3	5.5	7.7			10.5		5.5
3/12/2008	0.3	8	7.2	10.5				8
4/1/2008	0.3	11.3	7.3	9.9				11.3
5/1/2008	0.3	12.4	7.1	9.7				
6/3/2008	0.3	18.4	7.4	7.2				
7/2/2008	0.3	20.6	7.4	6.2				
8/7/2008	0.3	23.7	7.4	4.6				
9/9/2008	0.3	21.5	7.4	7.1				
10/7/2008	0.3	15	7.5	7.8				
11/4/2008	0.3	11.4	7	7.2				
12/10/2008	0.3	6.5	7.2	12.3				
1/12/2011	0.3	0.7	7.6	13.8				0.7
3/16/2011	0.3	9.4	6.6	9.7				9.4
5/16/2011	0.3	17.1	7	7.1				
7/18/2011	0.3	21.4	7.1	5.9				
9/6/2011	0.3	22	7.1	5.7				
11/17/2011	0.3	13.2	6.8	7.4				
2/13/2012	0.3	1.26	6.94	12.59				1.26
90th Percentile		**22.9**	**7.4**					**12.3**
10th Percentile		**4.4**	**6.4**					**1.7**
Average							**25.3**	**7.7**

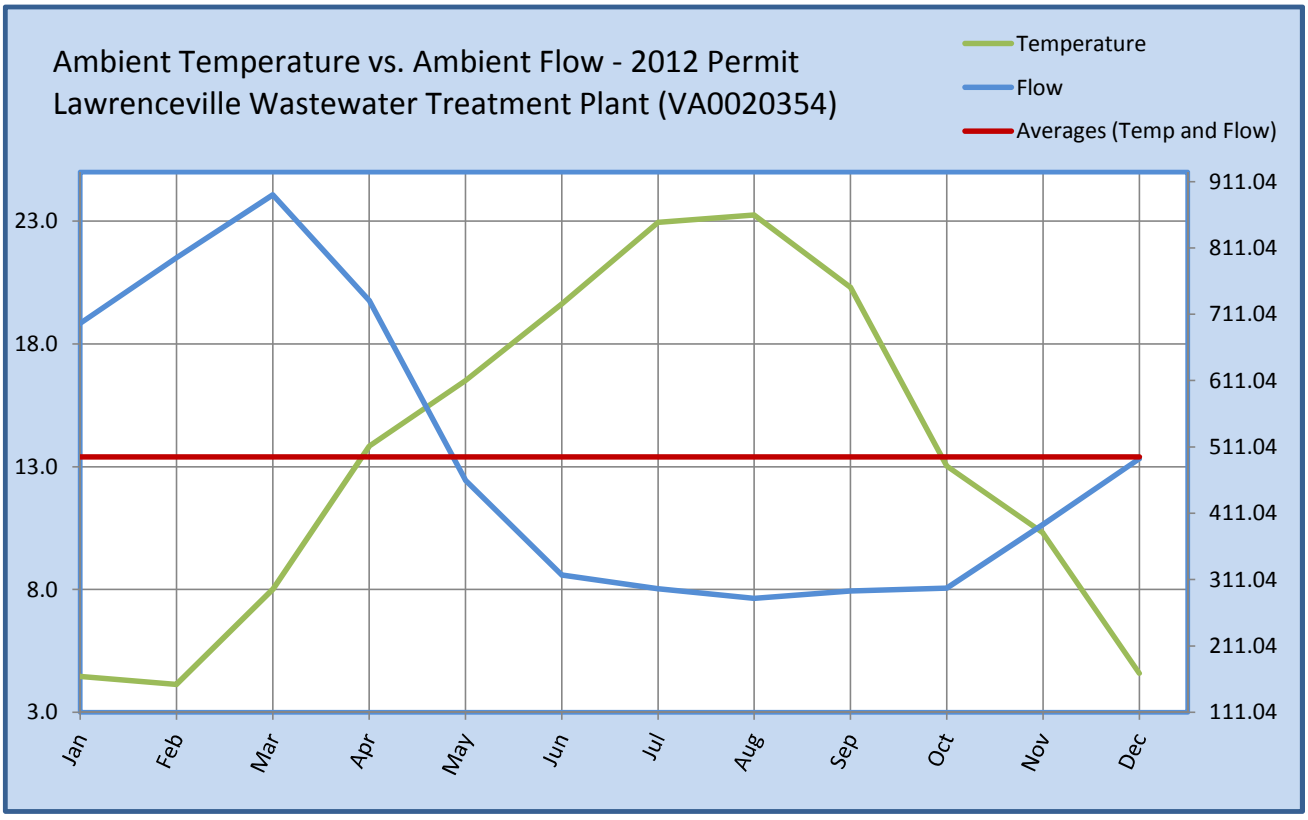
Winter/High Flow Confirmation - Informational

2012 Permit Reissuance - Lawrenceville Wastewater Treatment Plant (VA0020354)

	Average Monthly Temperatures (˚C)		Average Monthly Flows (cfs)	
	Monitoring Station 5ARSE001.22		USGS Flow Gage #02051500 (1929-2011)	
Month	**Average Temp. (˚C)**	**Below Yearly Average**	**Average Flow (cfs)**	**Above Yearly Average**
Jan	4.5	X	697	X
Feb	4.1	X	796	X
Mar	8.0	X	891	X
Apr	13.8		732	X
May	16.5		461	
Jun	19.6		318	
Jul	22.9		297	
Aug	23.2		283	
Sep	20.3		294	
Oct	13.0	X	298	
Nov	10.3	X	394	
Dec	4.6	X	493	
Yearly Average ►	13.4	Yearly Average ►	496	

Winter Season	
Basis	Month Range
Flow:	**January - April**
Temp.:	**October - March**
Combined:	**January - March**

Please note that these winter months are determined by comparing relative values rather than actual values. Flows used for this evaluation are taken from a stream gage located on the Meherrin River, the data from which has been determined to have a strong correlation to flow variations in Roses Creek (see Flow Frequency memo in Attachment A). These flows do not represent actual flows within Roses Creek.



Attachment No. 4

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Water Regional Office

P.O. Box 6030, 4900 Cox Road, Glen Allen, VA 23058 804/527-5020

SUBJECT: Recommended Effluent Limits for Lawrenceville STP (VA0020354)

TO: Curt Linderman, P.E.

FROM: Jon van Soestbergen, P.E.

DATE: April 25, 1996

COPIES: Diane Cook, Technical Services, Modeling File

The Roses Creek model used to determine recommended effluent limits for the subject facility was revised to exclude the Alberta STP discharge from the model, as this discharge is a significant distance upstream. The Regional Model, V3.2 used for the modeling effort does not require inclusion of discharges more than 3 miles upstream of the discharge being modeled.

Results of the revised model do not change the recommended effluent limits as presented in the April 11, 1996 memorandum regarding the stream sanitation analysis performed for Roses Creek. These recommended limits are repeated below.

Town of Lawrenceville, Municipal STP (VA0020354)

Dry Season, Low Flow (May - December) (January-April)		Wet Season, High Flow	
Q	= 1.2 mgd	Q	= 1.2 mgd
$cBOD_5$	= 10.0 mg/l	$cBOD_5$	= 20.0 mg/l
TKN	= 3.0 mg/l	TKN	No limit necessary
DO	= 6.5 mg/l	DO	= 5.0 mg/l

If you have any questions or require additional information related to this modeling effort, please do not hesitate to contact the PRO Planning Unit.

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Water Regional Office

P.O. Box 6030, 4900 Cox Road, Glen Allen, VA 23058 804/527-5020

SUBJECT: Results of Stream Sanitation Analysis of Roses Creek and Recommended Effluent Limits for Lawrenceville STP (VA0020354) and Alberta STP (VA0026816)

TO: Curt Linderman, P.E.

FROM: Jon van Soestbergen, P.E.

DATE: April 11, 1996

COPIES: Diane Cook, Technical Services, Modeling File

Modeling Purpose

The Town of Lawrenceville submitted a VPDES Permit Application for a plant expansion from the current flow of 0.6 mgd to 1.2 mgd, which resulted in this stream sanitation analysis and modeling effort. The purpose of this memorandum is to document the results of the effort and to present recommended effluent limits for a discharge flow of 1.2 mgd. The increased discharge flow will exceed 1.0 mgd, requiring processing as a major discharge, and requiring VA DEQ Headquarters and EPA Region III review and concurrence.

Background Information

The Lawrenceville Municipal Sewage Treatment Plant (STP) is located on Meadow Lane in the Town of Lawrenceville, which is an incorporated Town within Brunswick County. The STP is currently permitted to discharge to Roses Creek at river mile 5ARSE000.28. Roses Creek is a tributary to Great Creek in DEQ Waterbody VAP-K07R-00 in the Meherrin River Subbasin of the Chowan River Basin. The proposed increased discharge location is the same as the current discharge location.

The design flow of the current STP is 0.6 mgd. The discharge is currently permitted under VPDES Permit No. VA0020534. Permitted effluent limits for 5-day biochemical oxygen demand (BOD_5) and dissolved oxygen (DO) are 30 mg/l and 6.5 mg/l, respectively. The discharge is addressed in the current Chowan River-Dismal Swamp Basins 303(e) Water Quality Management Plan (WQMP), adopted in April, 1982 (Table 2, page 10, and Table 3A, page 23). Discharge parameters and limits addressed in the WQMP are flow (Q = 0.7 mgd), BOD_5 (30 mg/l), and total suspended solids (30 mg/l).

The Town of Alberta Municipal STP discharges to Roses Creek at river mile 5ARSE009.83, upstream of the Lawrenceville discharge. The discharge is currently permitted for a design flow of 0.1 mgd under VPDES Permit No. VA0026816. Permitted effluent limits for BOD_5 and DO are 30 mg/l and 5.0 mg/l, respectively. This discharge is also addressed in the aforementioned WQMP.

The effects of the Lawrenceville STP discharge to Roses Creek on DO concentrations in Roses Creek and Great Creek have been previously modeled. The most recent model was created using the CBOXYSAG program in July, 1979. In January, 1987 the model was reexamined and effluent limits

of BOD_5 = 16 mg/l, DO = 6.5 mg/l were recommended for a discharge flow of 0.7 mgd. The effects of the Alberta STP on water quality in Roses Creek have not been modeled.

The Draft Plan and Draft Environmental Impact Statement, Great Creek Watershed, Brunswick and Lunenburg Counties, Virginia, Southside Soil and Water Conservation District, et. al., October 1975, was reviewed in connection with this modeling effort. This report addresses the construction of a multi-purpose impoundment on Great Creek, to be used for both flood control and as a source of water for one of the Town of Lawrenceville's public water supply intakes, located on Great Creek downstream of the impoundment. This report states that the minimum downstream releases from the impoundment will be equal to the annual 7 consecutive day mean low flow with a 10 year recurrence interval (7Q10) (page I-10). The report also provides the Great Creek drainage area above the impoundment location (Project Map, page I-12) and the elevation of Great Creek at its confluence with the Meherrin River (page II-29).

The Town of Lawrenceville collected water quality data on a monthly basis from Roses Creek as a VPDES permit condition from January 1992 through February 1994. Each data set consisted of measurements for DO, pH, temperature, and total ammonia. A total of 26 data sets were collected. A review of the DO, pH, and temperature data indicated that there was 1 violation of the pH standard. There were also 3 incidents where the difference in temperature above and below the STP discharge exceeded 3 degrees C. Monitored ammonia concentrations below the STP discharge were significantly higher than those above the discharge in more than 50 percent of the samples taken; however, ammonia concentrations in the stream were not checked for water quality standard violations.

DEQ maintains Ambient Water Quality Monitoring (AWQM) stations on Roses Creek and Great Creek. The Roses Creek station was initiated in 1994 and is located at the Route 678 bridge at river mile 5ARSE001.22, upstream of the Lawrenceville STP discharge. The Great Creek station was initiated in 1990 and is located at the Route 713 bridge at river mile 5AGTC005.40, upstream of the confluence of Roses Creek with Great Creek. Additionally, DEQ maintains two biological monitoring stations on Roses Creek. The biological monitoring stations are used to assess the effects of the Alberta STP discharge on general water quality in Roses Creek. A control station is located at river mile 5ARSE009.83, immediately upstream of the discharge. An impact station is located at river mile 5ARSE006.68, approximately three miles below the discharge.

Water quality data collected from the AWQM and biological monitoring stations were used to assess the Great Creek watershed (VAP-K07R-00) for the Clean Water Act's 1996 305(b) report. The assessment covers the period April 1993 through March 1995. The results of the assessment indicate that there is currently no impairment of Great Creek. Roses Creek was assessed not supporting for aquatic life use support based on a severely impaired benthic community at the impact biological monitoring station below the Alberta STP as compared to the benthic community at the control station. The segment consists of the 3.83 miles of Roses Creek from the Alberta STP discharge point downstream to the confluence of Roses Creek with Soloman Creek. Roses Creek was also assessed not supporting of swimming use based on 3 fecal coliform standard violations in 4 samples collected at AWQM station 5ARSE001.22. This segment consists of 9.83 miles of Roses Creek from the Alberta STP discharge downstream to the mouth of Roses Creek at its confluence with Great Creek. The segment assessed not supporting for swimming use based on the fecal coliform standard violations includes the Lawrenceville STP discharge location. The impairment of Roses Creek is attributed to the Alberta STP discharge. Both segments are included on the 303(d) list submitted to EPA by DEQ in April 1996, which lists and prioritizes segments requiring Total Maximum Daily Loads. These assessments reflect a downgraded assessment from the 1994 and 1992 305(b) cycles. In both the

1994 and 1992 305(b) reports, the affected waterbodies were assessed fully supporting of designated Clean Water Act uses.

Site Inspection

On March 14, 1996, Planning Unit Staff and the Permit Writer performed a site inspection of the receiving stream near the Lawrenceville STP discharge. Town of Lawrenceville personnel were also present. The receiving stream was "walked" from the discharge location downstream to its confluence with Great Creek to characterize the stream channel, obtain instantaneous water quality data, and obtain a visual impression of overall water quality at the time of inspection. Because of accessibility constraints, Great Creek was not walked downstream of the confluence of Roses Creek and Great Creek. However, Great Creek was walked for approximately 0.2 miles upstream of the confluence to obtain a general impression of water quality. Instantaneous water quality data measurements taken consisted of dissolved oxygen (DO), temperature, and pH, and were taken at selected points along Roses Creek and in both Roses Creek and Great Creek at the confluence of the two creeks. Fecal coliform data was not collected during the site visit, as this water quality parameter is not directly associated with dissolved oxygen concentrations in the stream and not required for the modeling effort.

Results of the site inspection indicated that at the time of the site inspection overall water quality was good in Roses Creek downstream of the discharge and in Great Creek at the confluence of the two creeks. There were no sludge deposits and DO and pH were both at acceptable levels.

7Q10 Flow Determination

A flow frequency determination was performed by DEQ and documented in a March 6, 1996 memorandum to the permit writer. Dry season and wet season 7Q10 flows at the Lawrenceville STP discharge point were determined based on flow records from the VDEQ continuous record gage on Great Creek near Cochran, VA (#02051600) and a drainage area comparison. The results of the flow frequency determination are provided in the copy of the March 6, 1996 memorandum included with the attachment. Additionally, 7Q10 flows for Roses Creek at the Alberta STP discharge point and for the Meherrin River above its confluence with Great Creek were determined.

Tier Designation and Antidegradation Review

The waterbody segment affected by the Lawrenceville STP discharge is designated a Class III water in the Virginia Water Quality Standards (VR680-21-08-12). No special standards apply. The previous modeling effort indicates that under modeled conditions, the DO concentration in the affected segment will decrease to 5.0 mg/l, or the equivalent of the water quality standard for Class III waters, thereby satisfying requirements for a Tier 1 designation, with the parameter of concern being DO. Additionally, the base line water quality model prepared for this stream sanitation analysis, which simulates existing conditions, predicts that the water quality standard for DO would be violated in both Roses Creek and Great Creek under 7Q10 conditions. Fecal coliform standard violations do not satisfy requirements for Tier 1 designation.

Because Roses Creek and Great Creek are designated Tier 1 waters, antidegradation need not be applied for these waterbodies in the modeling effort. However, the Meherrin River at its confluence with Great Creek is designated a Tier 2 water, and antidegradation does apply to this waterbody.

Modeling Approach

Because the current Alberta STP discharge to Roses Creek is considered a source of impairment of Roses Creek and has not been previously modeled, and because the Meherrin River is a Tier 2 water subject to antidegradation review, the model was expanded from previous modeling efforts to incorporate both Roses Creek between the Alberta STP and Lawrenceville STP discharges, and the Meherrin River.

The Regional Water Quality Model for Free Flowing Streams (Version 3.2) was used to model the effects of the current Alberta STP discharge and the proposed Lawrenceville discharge to Roses Creek. This model was used in lieu of the CBOXYSAG model used in previous modeling efforts because 1) the model was expanded to include additional discharges and waterbody segments, 2) the CBOXYSAG model was never used to establish permitted effluent discharge limits, and 3) PRO is making an effort to standardize the model used for determining effluent limits in simple modeling cases such as this one.

Model input data was obtained from several sources, including but not limited to the previously mentioned CBOXYSAG model and Draft Plan and EIS Report, the March 14, 1996 site inspection, several WQAP Flow Frequency Determination memoranda, and data from EPA's STORET database. Model input parameters, calculations, and justification are included in the attached model documentation.

The permittee verbally requested that wet weather relief be provided, if possible, through tiering of the discharge limits. Therefore, the effects of the discharge were modeled under both dry weather (low background flow) and wet weather (high background flow) conditions. Background flows and high flow months were established by WQAP in the Flow Frequency Determination memoranda.

Four waterbody segments were established for the model. The first consists of Roses Creek from the Alberta STP discharge point downstream to the Lawrenceville STP discharge point. The second consists of Roses Creek from the Lawrenceville STP discharge point downstream to its mouth at the confluence with Great Creek. The third consists of Great Creek from the confluence with Roses Creek downstream to its mouth at the confluence with the Meherrin River. The fourth and final segment consists of the Meherrin River flows from its confluence with Great Creek to a point five miles downstream.

To determine whether antidegradation is violated in the Meherrin River (segment 4), a base line model was established to predict the effect of the currently permitted discharges on DO concentrations in the modeled segments under 7Q10 conditions.

Results and Recommendations

The modeling effort to establish base line conditions predicts that water quality standards in Roses Creek are violated downstream of the Alberta STP discharge, and in Great Creek downstream of the Lawrenceville STP discharge under dry weather (low flow) 7Q10 conditions. Under wet weather (high flow) 7Q10 conditions, the model predicts water quality standards will be maintained with the currently permitted discharges.

The modeling effort performed for the proposed increased Lawrenceville discharge (Q = 1.2 mgd) indicates that during the dry weather (low flow) season (May-December), water quality based effluent limits for $cBOD_5$, Total Kjeldahl Nitrogen (TKN), and DO are necessary for the Alberta and Lawrenceville

discharges to maintain the Class III water DO standard in Roses Creek and Great Creek, respectively. The model projects the DO sag in Roses Creek to be 1.4 miles downstream of the Alberta STP discharge. The model projects the DO sag in Great Creek to be 4.3 miles downstream of the confluence of Roses Creek with Great Creek.

The model predicts that for a discharge flow of 1.2 mgd during the wet weather (high flow) season (January-April), water quality based limits are not necessary to maintain water quality standards in Roses Creek or Great Creek. However, water quality based limits for $cBOD_5$ and DO are necessary for the Lawrenceville discharge to satisfy antidegradation requirements in the Meherrin River. Water quality based limits are not necessary for the Alberta STP discharge, and a TKN limit is not necessary for the Lawrenceville discharge under high flow conditions.

The Piedmont Regional Office Planning Staff recommend the effluent limits listed below be incorporated into the VPDES permit for the Town of Lawrenceville's proposed expanded discharge VPDES Permit. Furthermore, it is recommended that the Town of Alberta's VPDES permit be modified to incorporate the effluent limits listed to maintain water quality in Roses Creek under low flow 7Q10 conditions.

Town of Lawrenceville, Municipal STP (VA0020354)

Dry Season, Low Flow (May - December)		Wet Season, High Flow (January-April)	
Q	= 1.2 mgd	Q	= 1.2 mgd
$cBOD_5$	= 10.0 mg/l	$cBOD_5$	= 20.0 mg/l
TKN	= 3.0 mg/l	TKN	No limit necessary
DO	= 6.5 mg/l	DO	= 5.0 mg/l

Town of Alberta, Municipal STP (VA0026816)

Dry Season, Low Flow (May - December)		Wet Season, High Flow (January-April)	
Q	= 0.1 mgd	Q	= 0.1 mgd
$cBOD_5$	= 12.0 mg/l	$cBOD_5$	= 25.0 mg/l
TKN	= 3.0 mg/l	TKN	No limit necessary
DO	= 6.5 mg/l	DO	= 5.0 mg/l

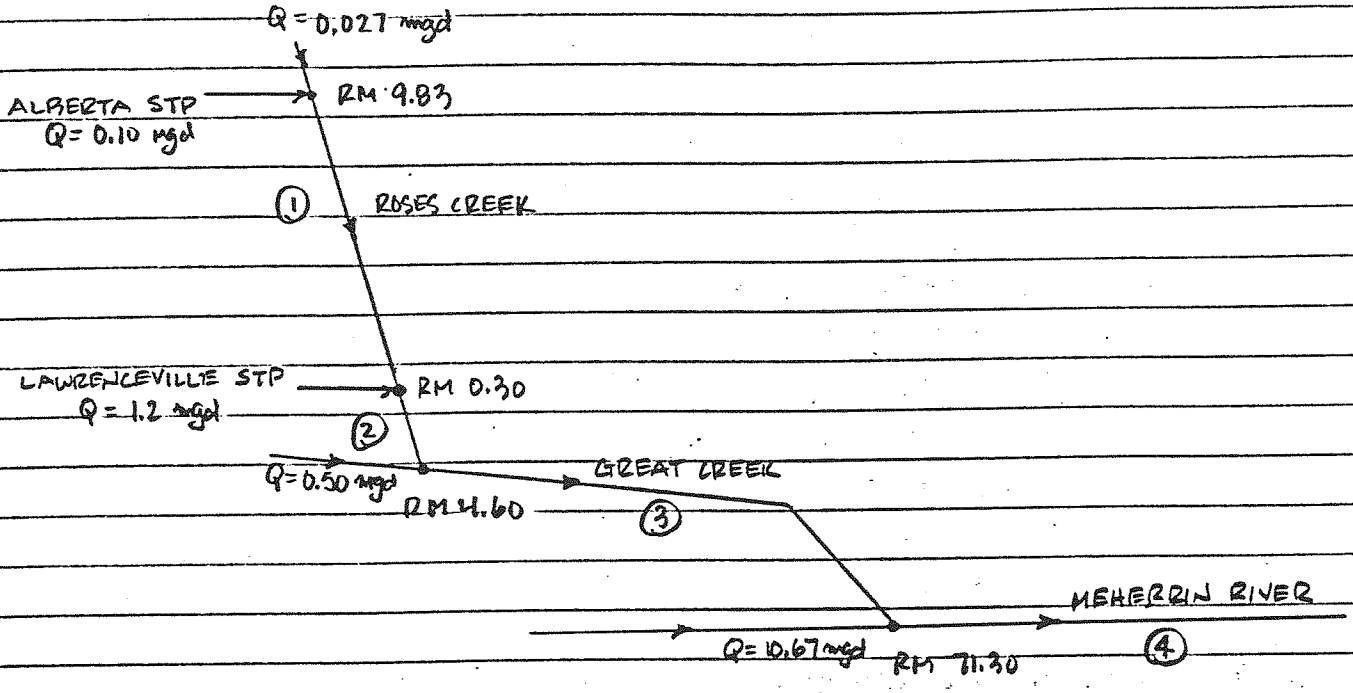
Full model documentation, including a model schematic, pertinent calculations, a copy of the topographic map showing the discharge locations, and pertinent information from other sources is included as the attachment to this memorandum. An electronic copy of the model, input file, and results can be obtained by contacting the author.

If you have any questions or require additional information related to this modeling effort, please do not hesitate to contact the PRO Planning Unit.

ALBERTA / LAWRENCEVILLE MODEL

04-04-9(

MODEL SCHEMATIC



MAR 1996
PRO

MEMORANDUM

...IT OF ENVIRONMENTAL QUALITY - WATER DIVISION
...ater Quality Assessments and Planning
...eet P.O. Box 10009 Richmond, Virginia 23240

Was all this attached to Jon's memo? It looks like unnecessary to include here

...Frequency Determination
...enceville STP - VA#0020354

...e Osborne-Cook, PRO

...Herman, WQAP - Paul

...ch 6, 1996

COPIES: Ron Gregory, Charles Martin, File

The Lawrenceville STP discharges to the Roses Creek near Lawrenceville, VA. Stream flow frequencies are required at this site for use by the permit writer in developing effluent limitations for the VPDES permit.

The VDEQ operated a continuous record gage on the Great Creek near Cochran, VA (#02051600) from 1958 to 1986. The gage was located at the Route 618 bridge in Brunswick County, VA. The flow frequencies for the gage and the discharge point are presented below. The values at the discharge point were determined by drainage area proportions and do not address any withdrawals, discharges, or springs lying upstream.

Great Creek near Cochran, VA (#02051600):

Drainage Area = 30.7 mi^2 0.017 cfs/mi^2

1Q10 = 0.38 cfs	High Flow 1Q10 = 6.8 cfs
7Q10 = 0.52 cfs	High Flow 7Q10 = 7.8 cfs
30Q5 = 1.7 cfs	HM = 7.1 cfs

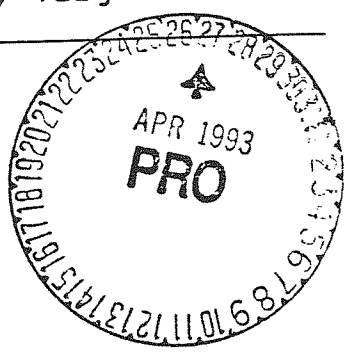
Roses Creek at Lawrenceville STP discharge point:

Drainage Area = 27.42 mi^2

		Jan-Apr
1Q10 = 0.34 cfs .219	High Flow 1Q10 = 6.1 cfs	3.94
7Q10 = 0.46 cfs .297	High Flow 7Q10 = 7.0 cfs	4.52
30Q5 = 1.5 cfs .969	HM = 6.3 cfs	4.07

The high flow months are January through April. If you have any questions concerning this analysis, please let me know.

MEMORANDUM
DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
Office of Water Resources Management
4900 Cox Road P. O. Box 11143 Richmond, Virginia 23230



SUBJECT: Flow Frequency Determination
Town of Alberta STP - #VA0026816

TO: D. X. Ren, PRO

FROM: Paul Herman, OWRM-WQAP

DATE: April 23, 1993

COPIES: Ron Gregory, Charles Martin, Dale Phillips, Curt Wells, Mark Richards, File

The Town of Alberta STP discharges to Roses Creek near Cochran, VA. Stream flow frequencies are required at this site for use by the permit writer in developing effluent limitations for the VPDES permit.

The VWCB operated a continuous record gage on Great Creek near Cochran, VA (#02051600) from 1958-1986. The gage is approximately 2.25 miles southwest of the discharge point. The flow frequencies for the gage and the discharge point are presented below. The values at the discharge point were determined by drainage area proportions.

Great Creek near Cochran, VA (#02051600):

Drainage Area	= 30.7	mi^2
1Q10	= 0.38	cfs
7Q10	= 0.52	cfs
High Flow 7Q10	= 7.8	cfs
30Q5	= 1.7	cfs
HM	= 7.1	cfs

Roses Creek at discharge point:

Drainage Area	= 2.43	mi^2
1Q10	= 0.03	cfs
7Q10	= 0.04	cfs
High Flow 7Q10	= 0.62	cfs
30Q5	= 0.13	cfs
HM	= 0.56	cfs

This analysis does not account for any springs, withdrawals or discharges that may be present upstream of the discharge point.

If you have any questions concerning this analysis, please let me know.

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
Water Quality Assessments and Planning
629 E. Main Street P.O. Box 10009 Richmond, Virginia 23240

SUBJECT: Flow Frequency Determination - Amendment
Town of Alberta STP - VA#0026816

TO: Diane Osborne, PRO

FROM: Paul Herman, OWRM-WQAP Paul

DATE: December 21, 1993

COPIES: Ron Gregory, Charles Martin, Dale Phillips, Curt Wells, D.X. Ren, File

Per your request, I am providing the 1Q10 and 7Q10 flow frequencies for the low temperature months November through April and also the 1Q10 for the high flow months of January through April. The flow frequencies for the reference gage and the discharge point are listed below.

Great Creek near Cochran, VA (#02051600):

Drainage Area = 30.7 mi^2		
1Q10 = 3.22 cfs		(November - April)
7Q10 = 3.67 cfs		(November - April)
High Flow 1Q10 = 6.8 cfs		(January - April)

Roses Creek at discharge point:

Drainage Area = 2.43 mi^2		
1Q10 = 0.25 cfs		(November - April)
7Q10 = 0.29 cfs		(November - April)
High Flow 1Q10 = 0.54 cfs		(January - April)

If you have any questions concerning the amended flow frequencies listed above please let me know.

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
Water Quality Assessments and Planning
629 E. Main Street P.O. Box 10009 Richmond, Virginia 23240

SUBJECT: Flow Frequency Determination
Lawrenceville STP - VA#0020354

TO: Diane Osborne-Cook, PRO

FROM: Paul Herman, WQAP

DATE: March 6, 1996

COPIES: Ron Gregory, Charles Martin, File

This memo is an addition to my earlier memo on the subject dated March 6, 1996.

Additional flow data has been requested for the Meherrin River above its confluence with the Great Creek. This analysis of the Meherrin River used the USGS continuous record gage on the Meherrin River near Lawrenceville, VA (#02051500) which has been operating since 1929. The flows for the Meherrin River above its confluence with the Great Creek were determined using drainage area proportioning. The flows for the gaging station and the point of evaluation are provided below.

Meherrin River near Lawrenceville, VA (#02051500):

Drainage Area = 552 mi^2

1Q10 = 13 cfs — High Flow 1Q10 = 93 cfs
7Q10 = 16 cfs — High Flow 7Q10 = 118 cfs
30Q5 = 38 cfs — HM = 139 cfs

Meherrin River above Great Creek:

Drainage Area = 568.62 mi^2

1Q10 = 13.4 cfs — High Flow 1Q10 = 95.8 cfs
7Q10 = 16.5 cfs — High Flow 7Q10 = 121.6 cfs
30Q5 = 39.1 cfs — HM = 143.2 cfs

The drainage area of the Great Creek at its mouth is 84.68 mi^2. The high flow months for the Meherrin River are January through April. If flows are needed for the Great Creek please refer to my March 6th memo which contains the flow frequencies for the Great Creek gage.

If you have any questions or require additional information, please give me a call.

LOW FLOW CONDITIONS

DATA PREPARATION WORKSHEET

(This Page is Needed Once for Each Model)

Site Inspection Performed? (Y/N)	Y
Name of Receiving Stream	ROSES CREEK (SA 2RSE)
River Basin	CHOWAN (MEHERRIN)
Section	3
Classification	III
Are Standards Violated Due to Natural Causes? (Y/N)	N
Class and Standards Appropriate for the Stream? (Y/N)	Y
Is There a Dam in the Reach to be Modeled? (Y/N)	N
Is There a Discharge Within 3 Miles of Model Start? (Y/N)	N
If "Y": Flow of Upstream Discharge (MGD)	
BOD5 at Model Start (Mg/l)	
TKN at Model Start (Mg/l)	
D.O. at Model Start (Mg/l)	
Name of Discharge Being Modeled	ALBERTA STP (VA0026816)
Flow	0.1 mgd
$cBOD_5$	9.0 mg/L
TKN	3.0 mg/L
D.O.	5.0 mg/L
Number of Segments to be Modeled?	4
7Q10 Estimation Method Code (1 = Drainage Area Comparison; 2 = Flow Comparison)	1
Name of Gauge Used to Estimate 7Q10	VWCB # 02051600
If Method 1: Gauge Drainage Area (Sq.Mi.)	30.7
Gauge 7Q10 (MGD)	0.336
Drainage Area at Discharge (Sq.Mi.)	2.43
If Method 2: Gauge 7Q10 (MGD)	
Observed Flow at Gauge (MGD)	
Observed Flow at Discharge Point (MGD)	
Is the Stream a Dry Ditch? (Y/N)	N
Does Antidegradation Apply? (Y/N)	N
Allocation Temperature for the Model (^{0}C) (Based on STORET 90th percentile temperature)	
Model File Disk Directory and Name	C:\MODELS\STREAM\ ALBERTA.MOD
Modeler and Date	Jon van Soestbergen 4/4/96

ALBERTA, MOD

SEGMENT DATA PREPARATION WORKSHEET

(This Page is Needed for Each Separate Segment Being Modeled)

	1	2	3	4
Segment Definition Code	3	1	1	4

1 = A Tributary Enters at the Segment End
2 = A Significant Physical Change Occurs at Segment End
3 = Another Discharge Enters at Segment End
4 = The Model Ends

Length of Segment (Mi.)	SEGMENT ②	9.53	0.30	4.60	5.00
(a): Enter Flow Estimated During Inspection (MGD)	19.4	(see site inspection summary)			
(b): Enter 7Q10 at Model Start (Include Discharge) (MGD)	1.50	(1.2 + 0.646(0.46))			
(c): Calculate the Flow Ratio (a/b)	0.077				
Estimated 7Q10 Width (Ft.)		1.0	5.0	5.0	20
Estimated 7Q10 Depth (Ft.)		0.17	0.6	0.8	2.0
Estimated 7Q10 Velocity (ft/sec)		0.63	0.75	0.8	0.5
Continuity Check:	②				
(a): Multiply: Width x Depth x Velocity x 0.6463	1.45				
(b): Enter 7Q10 at Model Start (Include Discharge) (MGD)	1.50				

If the two numbers above differ by much, there is an error
Review your data and revise your estimates

Drainage Area at the Beginning of This Segment (Sq.Mi.)	2.43	27.42	45.74	653.30
Drainage Area at the End of This Segment (Sq.Mi.)	27.42	27.49	57.19	740.15

Omit drainage area of "Tributary at End" section

Elevation at the Beginning of This Segment (Ft.)	289.5	162.3	159.0	137.0
Elevation at the End of This Segment (Ft.)	162.3	159.0	137.0	128.0

SEGMENT DATA PREPARATION WORKSHEET

	1	2	3	4
Type of Cross Section 1 = Rectangular; 2 = Triangular; 3 = Deep Narrow U; 4 = Wide Shallow Arc 5 = irregular; 6 = No Defined Channel	1	1	1	1
General Character of Stream 1 = Mostly Straight; 2 = Moderately Meandering; 3 = Severely Meandering 4 = No Defined Channel	2	2	2	1
Does This Segment Have a Pool and Riffle Character? (Y/N)	N	N	N	N
If "Y": Percent of Length That is Pools/100				
Percent of Length That is Riffles/100				
Estimated Average Depth of Pools (Ft.)				
Estimated Average Depth of Riffles (Ft.)				
Check that this is reasonable with the overall depth you entered earlier:				
(a): Enter the 7Q10 Depth (Ft.) from previous page				
(b): Enter % Pool Length x Pool Depth				
(c): Enter % Riffle Length x Riffle Depth				
(d): Enter (b+c)/100				
The values in (a) and (d) should be the same or very close				
General Bottom Type 1 = Sand; 2 = Silt; 3 = Gravel; 4 = Small Rock; 5 = Large Rock; 6 = Boulders	1	1	1	1
Sludge Deposits (organic sludge from malfunctioning STP) 1 = None; 2 = Few; 3 = Light; 4 = Heavy	1	1	1	1
Plants (Submerged macrophytes or rooted plants in waterway) 1 = None; 2 = Few; 3 = Light; 4 = Heavy	1	1	1	1
Algae (Visually evident algae growth in water) 1 = None; 2 = Only on Edges; 3 = On Entire Bottom	1	1	1	1
Does the Water Have an Evident Green Color? (Y/N) Indication of phytoplankton	N	N	N	N
		2	3	
Tributary at End	N	Y	Y	N
Tributary Drainage Area (Sq.Mi.)		45.74	568.62	
Tributary Flow (MGD) (Tributary D.A. x Gauge 7Q10/Gauge D.A.)	-	0.50	10.67	
Discharge at End				
Discharge Name	Section 1		Lawrenceville STP	
Discharge Flow (MGD)			1.2	
Discharge BOD5 (Mg/l)			4.0	
Discharge TKN (Mg/l)			3.0	
Discharge D.O. (Mg/l)			5.0	

HIGH FLOW CONDITIONS

DATA PREPARATION WORKSHEET

(This Page is Needed Once for Each Model)

Site Inspection Performed? (Y/N)	Y
Name of Receiving Stream	ROSES CREEK (SA2SE)
River Basin	CHOWAN (MEHERRIN)
Section	3
Classification	III
Are Standards Violated Due to Natural Causes? (Y/N)	N
Class and Standards Appropriate for the Stream? (Y/N)	Y
Is There a Dam in the Reach to be Modeled? (Y/N)	N
Is There a Discharge Within 3 Miles of Model Start? (Y/N)	N
If "Y": Flow of Upstream Discharge (MGD)	
BOD5 at Model Start (Mg/l)	
TKN at Model Start (Mg/l)	
D.O. at Model Start (Mg/l)	
Name of Discharge Being Modeled	ALBERTA STP (VA0026816)
Flow	0.1
$cBOD_5$	25.0
TKN	20.0
D.O.	5.0
Number of Segments to be Modeled?	4
7Q10 Estimation Method Code (1 = Drainage Area Comparison; 2 = Flow Comparison)	1
Name of Gauge Used to Estimate 7Q10	VDEQ #02051600
If Method 1: Gauge Drainage Area (Sq.Mi.)	30.7
Gauge 7Q10 (MGD)	5.04
Drainage Area at Discharge (Sq.Mi.)	2.43
If Method 2: Gauge 7Q10 (MGD)	
Observed Flow at Gauge (MGD)	
Observed Flow at Discharge Point (MGD)	
Is the Stream a Dry Ditch? (Y/N)	N
Does Antidegradation Apply? (Y/N)	N
Allocation Temperature for the Model (^{0}C) (Based on STORET 90th percentile temperature)	12.4
Model File Disk Directory and Name	C:\MODELS\STREAM\ ALBRHIGH.MOD
Modeler and Date	JON VAN SOESTBERGEN 4

SEGMENT DATA PREPARATION WORKSHEET

(This Page is Needed for Each Separate Segment Being Modeled)

HIGH FLOW CONDITIONS

SEGMENT NO.	1	2	3	4
Segment Definition Code 1 = A Tributary Enters at the Segment End 2 = A Significant Physical Change Occurs at Segment End 3 = Another Discharge Enters at Segment End 4 = The Model Ends	3	1	1	4
Length of Segment (Mi.)	9.53	0.30	4.60	5
Estimated 7Q10 Width (Ft.)	2.0	9.5	9.5	3
Estimated 7Q10 Depth (Ft.)	0.3	1.0	1.5	2.
Estimated 7Q10 Velocity (ft/sec)	1.0	0.75	1.0	1.
Drainage Area at the Beginning of This Segment (Sq.Mi.)	2.43	27.42	45.74	65
Drainage Area at the End of This Segment (Sq.Mi.) Omit drainage area of "Tributary at End" section	27.42	27.49	57.19	74
Elevation at the Beginning of This Segment (Ft.)	289.5	162.3	159.0	13
Elevation at the End of This Segment (Ft.)	162.3	159.0	137.0	12

(a): Enter Flow Estimated During Inspection (MGD)	19.4
(b): Enter 7Q10 at Model Start (Include Discharge) (MGD)	1.50
(c): Calculate the Flow Ratio (a/b)	0.077

Continuity Check:

(a): Multiply: Width x Depth x Velocity x 0.6463 ____

(b): Enter 7Q10 at Model Start (Include Discharge) (MGD)

If the two numbers above differ by much, there is an error

Review your data and revise your estimates

SEGMENT DATA PREPARATION WORKSHEET

	1	2	3	4
Type of Cross Section 1 = Rectangular; 2 = Triangular; 3 = Deep Narrow U; 4 = Wide Shallow Arc 5 = Irregular; 6 = No Defined Channel	1	1	1	1
General Character of Stream 1 = Mostly Straight; 2 = Moderately Meandering; 3 = Severely Meandering 4 = No Defined Channel	2	2	2	1
Does This Segment Have a Pool and Riffle Character? (Y/N)	N	N	N	N
If "Y": Percent of Length That is Pools/100				
Percent of Length That is Riffles/100				
Estimated Average Depth of Pools (Ft.)				
Estimated Average Depth of Riffles (Ft.)				
Check that this is reasonable with the overall depth you entered earlier:				
(a): Enter the 7Q10 Depth (Ft.) from previous page				
(b): Enter % Pool Length x Pool Depth				
(c): Enter % Riffle Length x Riffle Depth				
(d): Enter (b+c)/100				
The values in (a) and (d) should be the same or very close				
General Bottom Type 1 = Sand; 2 = Silt; 3 = Gravel; 4 = Small Rock; 5 = Large Rock; 6 = Boulders	1	1	1	1
Sludge Deposits (organic sludge from malfunctioning STP) 1 = None; 2 = Few; 3 = Light; 4 = Heavy	1	1	1	1
Plants (Submerged macrophytes or rooted plants in waterway) 1 = None; 2 = Few; 3 = Light; 4 = Heavy	1	1	1	1
Algae (Visually evident algae growth in water) 1 = None; 2 = Only on Edges; 3 = On Entire Bottom	1	1	1	1
Does the Water Have an Evident Green Color? (Y/N) Indication of phytoplankton	N	N	N	N
Tributary at End	N	Y	Y	N
Tributary Drainage Area (Sq.Mi.)		45.74	568.62	
Tributary Flow (MGD) (Tributary D.A. x Gauge 7Q10/Gauge D.A.)	-	7.51	78.6	-
Discharge at End	Section 1			
Discharge Name			Lawrenceville STP	
Discharge Flow (MGD)			1.2	
Discharge BOD5 (Mg/l)			21.0	
Discharge TKN (Mg/l)			20.0	
Discharge D.O. (Mg/l)			6.5	

ALBERTA / LAWRENCEVILLE MODS

04.04.96

SEGMENT 1 (ALBERTA TO LAWRENCEVILLE)

ALBERTA DISCHARGE:

R.M. = SA125E009.83 (FROM WQMP DATABASE)
ELEV. = 289.5 (FROM C. LINDERMAN E-MAIL 4.4.96)
D.A. = 2.43 mi^2 (FROM P. HERMAN MEMO 4.23.93)
7Q10 = 0.04 cfs

$$Q = 0.04 + (0.1\ mgd \times 1/0.646) = 0.1046\ cfs$$

ESTIMATE 7Q10 WIDTH = 1.0 FT
DEPTH = 2.0" = 0.17 FT

$$7Q10\ VEL. = \frac{0.1046}{0.17 \times 1.0} = 0.63\ fps$$

LAWRENCEVILLE STP (VA0020354)

ROSES CREEK MODEL 3.21.96

DRAINAGE AREA CALCULATIONS

① ROSES CREEK:

DRAINAGE AREA @ STP DISCHARGE = 27.42 mi^2 (FROM P. HERMAN MEMO 3

DRAINAGE AREA @ MOUTH = 27.49 mi^2 (FROM GAZETTEER)

② GREAT CREEK:

DRAINAGE AREA @ GAUGE 02051600 = 30.70 mi^2 (P. HERMAN MEMO 3.6.96)

DRAINAGE AREA @ DAM = 26,074 ac. = 40.74 mi^2 (DRAFT PLAN & EIS 10.75, p. I-

DRAINAGE AREA @ MOUTH = 84.68 mi^2 (FROM GAZETTEER)

DRAINAGE AREA @ ROSES CREEK = 45.74 mi^2 (ESTIMATED FROM PROJECT MAP IN D
PLAN & EIS - 5 mi^2 BELOW DAM)

DRAINAGE AREAS FOR MODEL:

BEGIN SEGMENT 1: 27.42 mi^2

END SEGMENT 1: 27.49 mi^2

BEGIN SEGMENT 2: 45.74 mi^2

END SEGMENT 2: 84.68 − 27.49 = 57.19 mi^2 (TOTAL GREAT CR. − TOTAL ROSES

ELEVATIONS

① ROSES CREEK:

ROSES CREEK @ STP DISCHARGE: 154.0 + 0.3(5280)(0.002105) = 162.33' (SLOPE FROM MODEL 1.5.8

ROSES CREEK @ MOUTH: 153.0' (FROM GAZETTEER)

② GREAT CREEK:

GREAT CREEK @ ROSES CREEK: 154.0'

GREAT CREEK @ IMPOUNDMENT: 137' (DRAFT PLAN & EIS, p. I-29)

LAWRENCEVILLE STP (VA0020354)
ROSES CREEK MODEL 3.21.96

TRIBUTARY FLOW CALCULATIONS

FLOW IN GREAT CREEK @ ROSES CREEK CONFLUENCE.

7Q10 @ GAUGE 02051600 = 0.52 cfs
DRAINAGE AREA @ GAUGE = 30.7 mi^2
INCREMENTAL FLOW = $\frac{0.52 \text{ cfs}}{30.7 \text{ mi}^2}$ = 0.0169 cfs/mi^2

DRAINAGE AREA @ ROSES = 45.74 mi^2 (FROM DRAINAGE AREA CALCULATIONS)
7Q10 @ ROSES = 45.74 mi^2 × 0.0169 $\frac{cfs}{mi^2}$ = 0.77 cfs × 0.646 $\frac{mgd}{cfs}$ = 0.50 mgd

TRIBUTARY FLOW = 0.50 mgd

MEHERRIN FLOW FROM NOAP 3/6/96 MEMO: 16.5 cfs = 10.67 mgd

SEGMENT LENGTHS

DETERMINED FROM USGS POWELLTON QUADRANGLE AS FOLLOWS:
SEGMENT ① : RSE 000.30 - RSE 000.00 (0.3 miles)
SEGMENT ② : GRT 004.60 - GRT 000.00 (4.6 miles)

MILEAGES CHECKED AGAINST GAZETTEER (SEGM. 2) AND PERMIT DATABASE (WQMP, OUTF TABLE). BOTH NUMBERS CHECK (4.60, 0.28, RESPECTIVELY).

SEGMENT ① RSE 9.83 - RSE 0.30 = 9.53
SEGMENT ④ NHN 71.3 - 66.3 (5.0 miles)

ALBERTA / LAWRENCEVILLE MODEL - ROSES CREEK

MEHERRIN RIVER CALCULATIONS FOR SEGMENT NO. 4

1. TRIBUTARY FLOW
   - MEHERRIN RIVER ABOVE GREAT CREEK
   FROM PAUL HERMAN 03.06.96 MEMORANDUM
   Q = 16.5 cfs × 0.6464 = 10.67 mgd

2. DRAINAGE AREA

- D.A. MEHERRIN TOTAL	1,017.98	mi^2	(GAZETTEER)
- D.A. MEHERRIN ABOVE GREAT CR.	568.62	mi^2	(P. HERMAN MEMO 3.6.96)
- D.A. GREAT CREEK	84.68	mi^2	(P HERMAN MEMO & GAZETTEER)
= D.A. MEHERRIN BELOW GREAT CR.	364.68		

R.M. GREAT CREEK CONFLUENCE = 71.3

D.A./R.M. BELOW GREAT CREEK = $\frac{364.68}{71.3}$ = 17.366 $\frac{mi^2}{mi}$

D.A. AT BEGINNING OF SEGMENT = 568.62 + 84.68 = 653.30

D.A. AT END OF SEGMENT = 653.30 + 5(17.366) = 740.13

INCREMENTAL FLOW CHECK

GREAT CREEK GAUGE (02051600) : 0.92 cfs / 30.7 mi^2 = 0.0169 cfs/mi^2

MEHERRIN R GAUGE (02051500) : 16.0 cfs / 552.0 mi^2 = 0.0290 cfs/mi^2

3. ELEVATIONS
   - AT BEGINNING OF SEGMENT : 137.0 (DRAFT PLAN & EIS, p II-29)
   - AT END SEGMENT : 128.0

- FROM GAZETTEER :

RM	ELEV
31.5	74
71.3	146

SLOPE = $\frac{146-74}{71.3-31.5}$ = 1.80 $\frac{ft}{mile}$

Δ ELEV SEGM 4 = 137.0 - 5(1.80) = 128.0

4.10.26

ALBERTA / LAWRENCEVILLE MODEL - ROSES CREEK

ALLOCATION TEMPERATURE CALCULATION (YEAR-ROUND CONDITIONS)

AQM STATION: 5AGTC005.40 (GREAT CREEK @ RTE. 713 BRIDGE)
DATA SOURCE: STORET RETRIEVAL 01/90 - 05/95 DATE OF RETRIEVAL 06.29.95

DATE	T(°C)	$x_i - \mu$	$(x_i - \mu)^2$
08/13/90	2.5	-11.17	124.85
11/27/90	9.8	- 3.87	15.01
02/12/91	5.0	- 8.67	75.23
05/23/91	21.4	7.73	59.70
08/20/91	24.8	11.13	123.79
11/25/91	9.9	-3.77	14.24
02/25/92	9.8	-3.87	15.01
05/20/92	17.1	3.42	11.74
08/20/92	21.8	8.13	66.04
11/12/92	12.4	-1.27	1.62
02/17/93	6.4	-7.27	52.91
05/17/93	21.1	7.43	55.15
11/15/93	15.3	1.63	2.64
02/16/94	5.7	-7.97	63.58
05/12/94	18.3	5.13	26.28
07/13/94	25.4	11.73	137.51
10/19/94	12.8	-0.87	0.76
01/11/95	5.6	-8.07	65.18
04/24/95	14.2	0.53	0.28

$n = 19$ Σ 259.8 Σ 911.52

$$\mu = \frac{\Sigma x_i}{\mu} = \frac{259.8}{19} = 13.67$$

$$\sigma^2 = \frac{\Sigma (x_i - \mu)^2}{n-1} = \frac{911.52}{18} = 50.64$$

$$T_{90} = \mu + z_p \sigma \quad (z_{90} = 1.282)$$

$\sigma = 7.12$

$T_{90} = 13.67 + 1.282\ (7.12)$

$T_{90} = 22.8\ °C$

LAWRENCEVILLE STP (VA0020354)
ROSES CREEK MODEL 3.21.96
HIGH FLOW CONDITIONS

TRIBUTARY FLOW CALCULATIONS (GREAT CREEK)

GAUGE 7Q10 = 7.8 cfs (PAUL HEEMAN MEMO 03.06.96)
GREAT CREEK DRAINAGE AREA = 45.74 mi^2
INCREMENTAL FLOW = 7.8 cfs / 30.7 mi^2 = 0.254 cfs/mi^2
TRIBUTARY FLOW = 45.74 mi^2 x 0.254 cfs/mi^2 x 0.646 mgd/cfs
Q = 7.51 mgd

MEHERRIN FLOW FROM 3/6/96 WQA? MEMO: 121.6 cfs = 78.6 mgd

HIGH 7Q10 CHANNEL DIMENSIONS (ESTIMATED BASED ON FLOW AND SITE INSPECTION)

	@ LAWRENCEVILLE ROSES CREEK	GREAT CREEK	@ ALBERTA ROSES CREEK	MEHERRIN
WIDTH (ft)	9.5	9.5	2.0	30
DEPTH (ft)	1.0	1.5	0.3	2.7
VELOCITY (fps)	0.75	1.0	1.0	1.5
FLOW (cfs)	7.1	14.3	0.62	121.6
	(2)	(3)	(1)	(4)

ALLOCATION TEMPERATURE

ADM STATION : 5AGTC005.40 (RTE. 713 BRIDGE)
HIGH FLOW MONTHS : JAN - APRIL
DATA SOURCE : STORET RETRIEVAL 01/90 - 05/95 DATE OF RETRIEVAL 06.29.95

DATE	T (°C)	$x_i - \mu$	$(x_i - \mu)^2$
02/12/91	5.0	-2.78	7.73
02/25/92	9.8	2.02	4.08
02/17/93	6.4	-1.38	1.90
02/16/94	5.7	-2.08	4.33
01/11/95	5.6	-2.18	4.75
04/24/95	14.2	6.42	41.22
			Σ 64.01

$n = 6$
$\mu = 46.7/6 = 7.78$

$\sigma^2 = \frac{\Sigma (x_i - \mu)^2}{n-1}$
$= 64.01/5 = 12.80$
$\sigma = 3.578$

$90^{th} = \mu + z_p \sigma \quad (z_p = 1.282)$
$= 7.78 + 1.282 (3.578)$
$T_{90} = 12.4\ ^\circ C$

STREAM INSPECTION REPORT FORM

Discharge Name: TOWN OF LAWRENCEVILLE MUNICIPAL STP (VA0020354)

Location: LAWRENCEVILLE, VA, WATERBODY VAP-K07R, HUC 03010204

General Stream Information:

Stream Name: ROSES CREEK, DISCHARGE AT SARSEDON.28

Topographic Map (attach copy): POWELLTON (009A) see attached

Basin: CHOWAN (MEHERRIN) Section: 3 Class: III Special Standards: N

Are the standards for this stream violated due to natural causes? (Y/N) N

Is this stream correctly classified? (Y/N) Y

If "N", what is the correct classification? —

Additional Discharges Information:

Is there a discharger within 3 miles upstream of the proposal? (Y/N) N

Does antidegradation apply to this analysis? (Y/N) N

Any dams in stream section being modeled? (Y/N) N

Notes:

- Roses Creek was modeled 01/05/87 for a discharge of 0.7 mgd from the Lawrenceville STP. CSOVYSAG model was used
- Lawrenceville has multipurpose impoundment (flood control, public water supply) on Great Creek about 5 miles upstream of the confluence with Roses Creek.
- The Draft Plan and Draft Environmental Impact Statement, Great Creek Watershed, Brunswick and Lunenburg Counties, Southside Soil & Water Conservation District, et al., October 1975. was reviewed for this model.

  Pertinent information: • Downstream release rate equal to 7Q10 flow (p. I-10)
  • Elevation Great Creek @ Meherrin River = 137' (p. II-29)
  • Drainage area @ dam = 26,074 acres. (project map., p. I-12)

- Site visit summary schematic (1 page) included as attachment to this form.
- Information for both segments is provided on single p. 2 of this form.
- Some pools & riffles were observed in stream during inspection. However, there were not enough to characterize the stream as having a pool/riffle character.

Inspected by JON VAN SOESTBERGEN Date 03-14-96 Region PRO
DIANE COOK (PERMIT WRITER)

STREAM INSPECTION REPORT FORM

(Fill In This Page for Each Segment To Be Modeled)

Specific Stream Information From Field Inspection: Segment Number ① , ②

Reason for Defining Segment: Tributary at End 1 Physical Change at End ____
Discharge at End ____ End of Model 2

	①	②
Length of Segment (mi.)	0.3	4.6
Estimated Average Width of Section (ft.)	20	20
Estimated Average Depth of Section (ft.) in Stream Center	1.5	2.0
Estimated Average Velocity of Section (ft/sec)	1.0	1.5
Estimated Flow in the Segment (MGD)	19.4	38.9

General Type of Cross Section in Segment: Rectangular 1, 2 Triangular ____ Deep Narrow U ____ Wide Shallow Arc ____
Irregular ____ No Defined Channel ____

General Channel Characteristics of Segment:
Mostly Straight ____ Moderately Meandering 1, 2 Severely Meandering ____ No Defined Channel ____

Does the stream have a pool and riffle character? (Y/N) N, N

If "Y": % of length that is pools ____ Average depth of pools (ft) ____

% of length that is riffles ____ Average depth of riffles (ft) ____

Bottom: Sand 1 2 Silt ____ Gravel ____ Small Rock ____ Large Rock ____ Boulders ____

Sludge Deposits: None 1, 2 Trace ____ Light ____ Heavy ____

Plants: Rooted: None 1, 2 Few ____ Light ____ Heavy ____

Algae: None 1, 2 Film on Edges Only ____ Film on Entire Bottom ____

Does the water have an evident green color? (Y/N) N, N

Tributary: (Fill in if a tributary enters at the end of the segment)

Tributary Name: GREAT CREEK

Width (ft) 20 Depth (ft) 2.0 Estimated Flow (MGD) 38.3

Any evident Water Quality problems in the Trib.? (Y/N) N

If "Y", explain: ____

Discharges: (Fill in if a discharge enters at the end of the segment)

Discharge Name: N/A

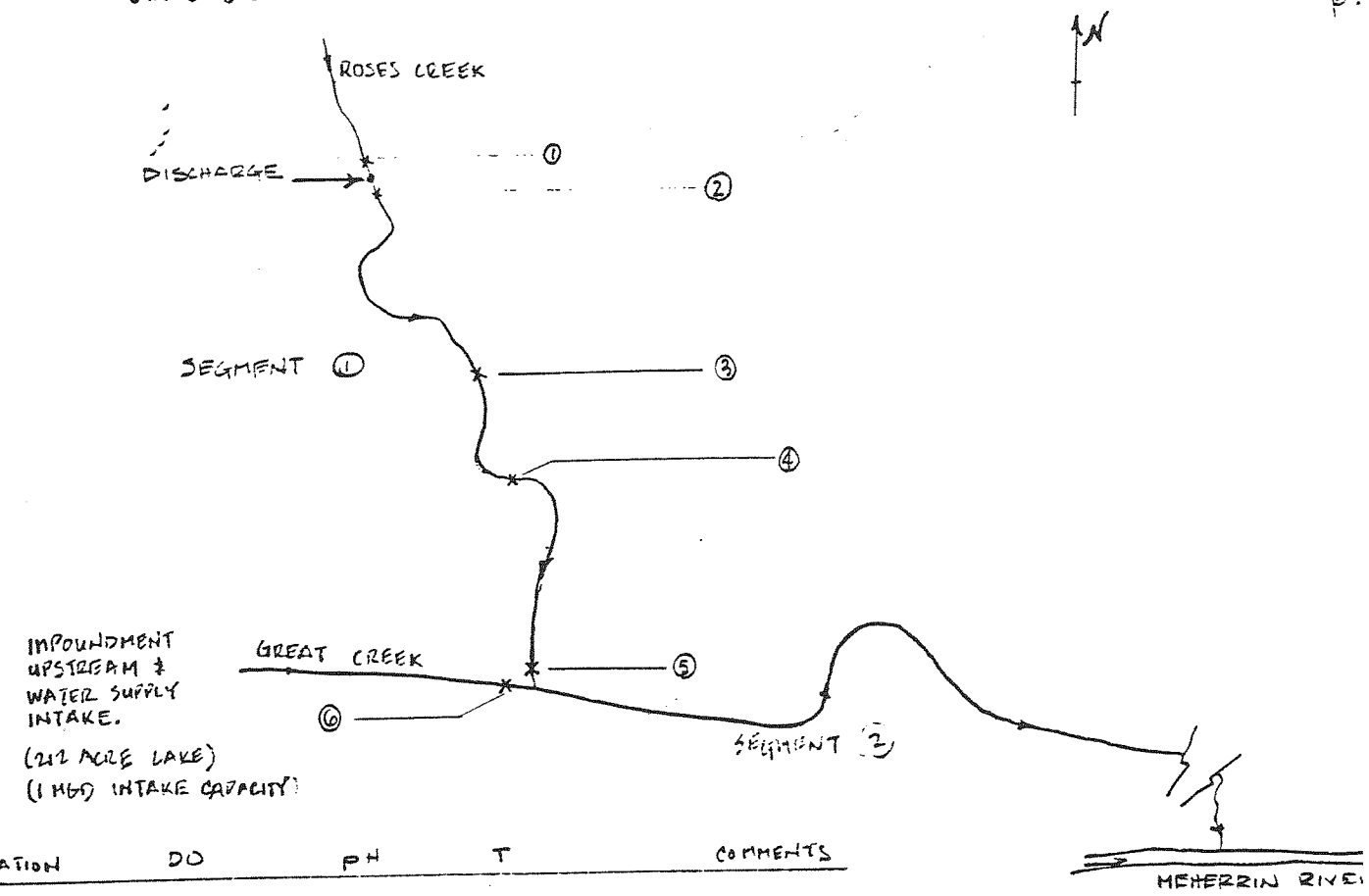
Any evident problems caused by this discharge? (Y/N) ____

If "Y", explain: ____

DATE OF SITE VISIT. 03/14/96

PERFORMED BY. JON VAN SOESBERGEN
DIANE COOK.

(VA0020354)
ROSES CREEK



LOCATION	DO	pH	T	COMMENTS
1	9.45	-	-	
2	8.50	-	-	
3	9.40	-	-	
4	9.18	-	-	
5	9.36	8.20	8.8	
6	9.20	7.80	11	

WEATHER: SUNNY, ± 65° F (ONE OF FIRST NICE DAYS OF SPRING, WATER STILL COLD)

ROSES CREEK FLOW:

INSPECTION	7Q10	
20' WIDE	5'	20 x 1.5 x 1.0 = 30 cfs x 0.646 = 19.4 mgd (INS
1.5' DEEP	0.6'	(ALL MEASUREMENTS ARE VISUAL APPROXIMATIONS)
1.0 FT/SEC	0.75	5 x 0.6 x 0.75 = 2.25 cfs x 0.646 = 1.45 mgd (7Q10)

GREAT CREEK:

20' WIDE	5.0'	20 x 2.0 x 1.5 = 60 cfs x 0.646 = 38.8 mgd (INSP
2.0' DEEP	0.8'	5 x 0.8 x 0.75 = 3.0 cfs x 0.646 = 1.94 mgd (7Q10)
1.5 FT/SEC	0.75	

7Q10 FLOW ESTIMATES INCLUDE DISCHARGE. (1.2 mgd)

To: Jon VanGeestel@RICHMD@DEC
Cc:
Bcc:
From: Diane G. Osborne@RICHMD@DEC
Subject:
Date: Friday, March 15, 1996 1:23:00 EST
Attach: O:\WPF1\DIANE\ATTACH\LAWPEVLL
Certify: N
Forwarded by:

Hi, Jon

I have (hopefully) attached the 1992-96 stream monitoring that Lawrenceville did. If you have any questions at all, please call. I expect to remain here on Monday if you need more info...

Lawrenceville's Monitoring of Roses Creek

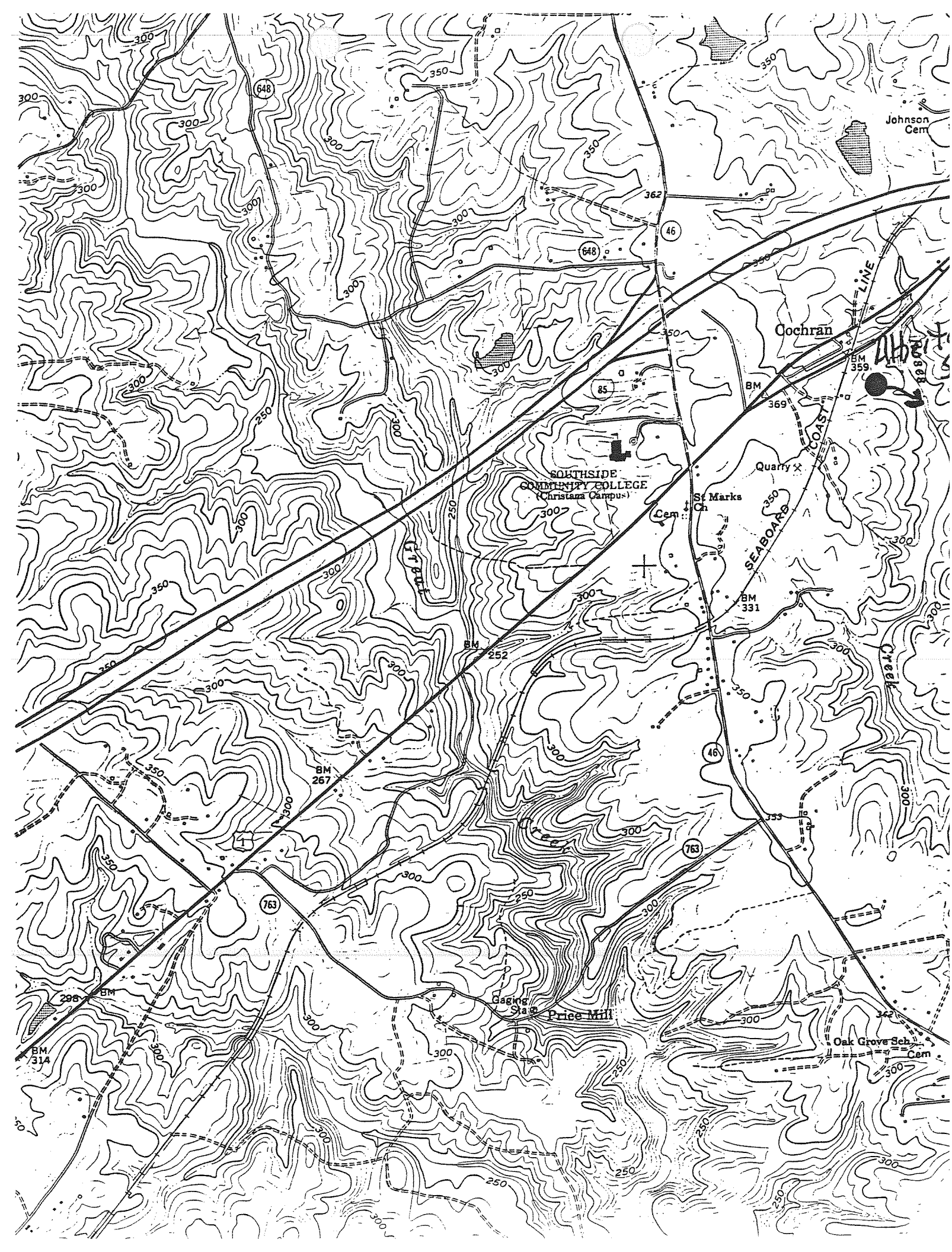
Month	Temp	pH upstream	DO	Tot Ammonia	Temp	pH	DO down	Tot Ammonia
Jan92	42F	7.0	12.0	0.22	43	7.1	12.0	3.90 *
Feb	49	7.1	11.0	0.19	50	7.1	11.2	1.44 *
Mar	47	6.8	11.0	0.16	48	6.8	11.1	1.59 *
Apr	66	6.9	11.8	0.21	66	7.0	11.7	0.35
May	68	6.7	8.4	0.35	69	6.9	8.4	0.35
Jun	64	6.7	9.5	0.23	64	6.7	9.5	1.03 *
Jul	79	6.9	8.4	0.14	80	6.8	9.6	0.83
Aug	80	7.6	8.6	0.11	80	7.6	8.6	0.24
Sep	71	6.4	7.0	0.24	71	6.5	7.0	1.16 *
Oct	61	6.4	9.2	0.48	61	6.4	9.1	2.5 *
Nov	48	6.5	10.0	0.19	50	6.3	10.2	2.04 *
Dec	45	6.6	10.6	0.33	47	6.5	11.1	1.16 *
Jan93	44	6.9	11.5	0.09	46	6.8	10.8	0.24
Feb	46	6.8	11.0	0.22	46	6.7	10.8	0.28
Mar	54	6.4	9.6	0.44	54	6.8	9.8	0.74
Apr	60	6.6	10.6	0.19	61	6.7	11.1	7.33 *
May	65	6.3	8.0	0.29	66	6.7	7.8	3.80 *
Jun	75	6.4	7.3	0.16	76	6.4	6.8	1.66 *
Jul	78	7.2	7.8	0.21	78	7.0	7.3	2.49 *
Aug	80	6.7	7.5	0.69	80	7.2	7.3	6.5 *
Sep	82	6.8	7.5	5.25 *	83	7.5	8.0	7.0 *
Oct	62	6.5	7.1	0.13	65	6.8	6.5	5.5 *
Nov	50	5.5	9.1	0.16	52	6.2	8.9	0.66
Dec	39	6.4	11.0	0.14	46	6.7	10.2	3.5 *
Jan94	38	6.9	12.2	0.19	43	6.7	11.2	1.1
Feb	48	6.0	11.0	0.19	47	6.3	10.8	0.68

STORET RETRIEVAL DATE 95/06/29 PGM=RET

5AGTC005.40
36 44 45.0 077 50 53.0 1
RT. 713 BRIDGE
51025 VIRGINIA BRUNSWICK
03-SOUTHEAST
5-CHOWAN + DISMAL SW
21VASWCB 900609 03010204
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00300 DO MG/L	00299 DO PROBE MG/L	00400 PH SU	31615 FEC COLI MPNECMED /100ML	31616 FEC COLI MFM-FCBR /100ML	31614 FEC COLI MPN TUBECODE	00010 WATER TEMP CENT	TO C
90/08/13	1415	WATER	1	6.9		7.63		200		2.5	
90/11/27	1330	WATER	1	10.9	10.9	6.94				9.8	
-91/02/12	1240	WATER	0.3	12.8	12.8	7.66		300		— 5.0	
91/05/23	1247	WATER	1	7.5		7.18		100K		21.4	
91/08/20	1200	WATER	0.983999		5.7	6.72		300		24.8	
91/11/25	1141	WATER	0.983999		9.4	6.64		100U		9.9	
-92/02/25	1110	WATER	0.983999		10.2	6.37		200		— 9.8	
92/05/20	1150	WATER	0.983999		7.4	6.07		400		17.1	
92/08/20	1209	WATER	0.983999		6.3	6.17		100		21.8	
92/11/12	1145	WATER	0.983999		8.2	6.81		100U		12.4	
-93/02/17	1234	WATER	0.983999		11.9	6.56		100U		— 6.4	
93/05/17	1210	WATER	0.983999		7.1	6.36		200		21.1	
93/08/11	1140	WATER	0.983999					100U			
93/11/15	1241	WATER	0.983999		7.0	6.60		100U		15.3	
-94/02/16	1333	WATER	0.983999		11.4	6.42		100		— 5.7	
94/05/12	1145	WATER	0.983999		7.6	6.47		100U		18.8	
94/07/13	1111	WATER	0.983999		5.6	6.70	330			25.4	
94/10/19	1122	WATER	0.983999		7.8	6.65	20			12.8	
-95/01/11	1212	WATER	0.983999		11.7	6.82	110			— 5.6	
-95/04/24	1033	WATER	0.983999		7.5	6.58	16000L			— 14.2	


Johnson Cem
Cochran
BM 359
BM 369
Quarry
SEABOARD COAST LINE
SOUTHSIDE COMMUNITY COLLEGE (Christiana Campus)
St Marks Ch
Cem
BM 331
BM 252
BM 267
Creek
Gaging Sta
Price Mill
298
BM 314
Oak Grove Sch
Cem
648
46
85
763
362
353
342

****

REGIONAL MODELING SYSTEM VERSION 3.2

****

MODEL SIMULATION FOR THE ALBERTA STP (VA0026816) DISCHARGE

TO ROSES CREEK -> GREAT CREEK -> MEHERRIN RIVER

COMMENT: ALBERTA AND LAWRENCEVILLE DISCHARGES

THE SIMULATION STARTS AT THE ALBERTA STP (VA0026816) DISCHARGE

********** PROPOSED PERMIT LIMITS **********

FLOW = .1 MGD cBOD5 = 12 Mg/L TKN = 3 Mg/L D.O. = 6.5 Mg/L

**** THE MAXIMUM CHLORINE ALLOWABLE IN THE DISCHARGE IS 0.014 Mg/L ****

THE SECTION BEING MODELED IS BROKEN INTO 4 SEGMENTS
RESULTS WILL BE GIVEN AT 0.1 MILE INTERVALS

********** BACKGROUND CONDITIONS **********

THE 7Q10 STREAM FLOW AT THE DISCHARGE IS 0.02660 MGD
THE DISSOLVED OXYGEN OF THE STREAM IS 7.722 Mg/L
THE BACKGROUND cBODu OF THE STREAM IS 5 Mg/L
THE BACKGROUND nBOD OF THE STREAM IS 0 Mg/L

********** MODEL PARAMETERS **********

SEG.	LEN. Mi	VEL. F/S	K2 1/D	K1 1/D	KN 1/D	BENTHIC Mg/L	ELEV. Ft	TEMP. °C	DO-SAT Mg/L
1	9.53	0.450	8.008	1.400	0.350	0.000	225.90	22.80	8.580
2	0.30	0.674	6.600	0.900	0.150	0.000	160.65	22.80	8.600
3	4.60	0.529	2.870	0.900	0.150	0.000	148.00	22.80	8.504
4	5.00	0.536	1.080	0.900	0.150	0.000	132.50	22.80	8.509

(The K Rates shown are at 20°C ... the model corrects them for temperature.)

********** RESPONSE FOR SEGMENT 1 **********

TOTAL STREAMFLOW = 0.1266 MGD
(Including Discharge)

DISTANCE FROM HEAD OF SEGMENT (MI.)	TOTAL DISTANCE FROM MODEL BEGINNING (MI.)	DISSOLVED OXYGEN (Mg/L)	cBODu (Mg/L)	nBODu (Mg/L)
0.000	0.000	6.757	24.748	0.000
0.100	0.100	6.457	24.218	0.000
0.200	0.200	6.201	23.700	0.000
0.300	0.300	5.984	23.193	0.000
0.400	0.400	5.800	22.697	0.000
0.500	0.500	5.647	22.211	0.000
0.600	0.600	5.520	21.736	0.000
0.700	0.700	5.417	21.270	0.000
0.800	0.800	5.335	20.815	0.000
0.900	0.900	5.271	20.370	0.000
1.000	1.000	5.222	19.934	0.000
1.100	1.100	5.188	19.507	0.000
1.200	1.200	5.167	19.090	0.000
1.300	1.300	5.156	18.681	0.000
1.400	1.400	5.155	18.281	0.000
1.500	1.500	5.161	17.890	0.000
1.600	1.600	5.175	17.507	0.000
1.700	1.700	5.195	17.132	0.000
1.800	1.800	5.221	16.766	0.000
1.900	1.900	5.251	16.407	0.000
2.000	2.000	5.285	16.056	0.000
2.100	2.100	5.323	15.712	0.000
2.200	2.200	5.363	15.376	0.000
2.300	2.300	5.405	15.047	0.000
2.400	2.400	5.450	14.725	0.000
2.500	2.500	5.496	14.410	0.000
2.600	2.600	5.544	14.101	0.000
2.700	2.700	5.592	13.800	0.000
2.800	2.800	5.641	13.504	0.000
2.900	2.900	5.691	13.215	0.000
3.000	3.000	5.741	12.933	0.000
3.100	3.100	5.792	12.656	0.000
3.200	3.200	5.842	12.385	0.000
3.300	3.300	5.893	12.120	0.000
3.400	3.400	5.943	11.861	0.000
3.500	3.500	5.993	11.607	0.000
3.600	3.600	6.043	11.358	0.000
3.700	3.700	6.092	11.115	0.000
3.800	3.800	6.140	10.877	0.000
3.900	3.900	6.188	10.645	0.000
4.000	4.000	6.236	10.417	0.000
4.100	4.100	6.283	10.194	0.000
4.200	4.200	6.329	9.976	0.000
4.300	4.300	6.375	9.762	0.000
4.400	4.400	6.420	9.553	0.000
4.500	4.500	6.464	9.349	0.000
4.600	4.600	6.508	9.149	0.000
4.700	4.700	6.550	8.953	0.000
4.800	4.800	6.592	8.761	0.000
4.900	4.900	6.634	8.574	0.000
5.000	5.000	6.674	8.390	0.000
5.100	5.100	6.714	8.211	0.000
5.200	5.200	6.753	8.035	0.000
5.300	5.300	6.791	7.863	0.000

ROSES CREEK SAG

5.400	5.400	6.829	7.695	0.000
5.500	5.500	6.866	7.530	0.000
5.600	5.600	6.902	7.369	0.000
5.700	5.700	6.937	7.211	0.000
5.800	5.800	6.972	7.057	0.000
5.900	5.900	7.006	6.906	0.000
6.000	6.000	7.039	6.758	0.000
6.100	6.100	7.072	6.614	0.000
6.200	6.200	7.104	6.472	0.000
6.300	6.300	7.135	6.333	0.000
6.400	6.400	7.166	6.198	0.000
6.500	6.500	7.196	6.065	0.000
6.600	6.600	7.225	5.936	0.000
6.700	6.700	7.254	5.809	0.000
6.800	6.800	7.282	5.684	0.000
6.900	6.900	7.310	5.563	0.000
7.000	7.000	7.337	5.444	0.000
7.100	7.100	7.364	5.327	0.000
7.200	7.200	7.390	5.213	0.000
7.300	7.300	7.415	5.102	0.000
7.400	7.400	7.440	5.000	0.000
7.500	7.500	7.565	5.000	0.000
7.600	7.600	7.676	5.000	0.000
7.700	7.700	7.722	5.000	0.000
7.800	7.800	7.722	5.000	0.000
7.900	7.900	7.722	5.000	0.000
8.000	8.000	7.722	5.000	0.000
8.100	8.100	7.722	5.000	0.000
8.200	8.200	7.722	5.000	0.000
8.300	8.300	7.722	5.000	0.000
8.400	8.400	7.722	5.000	0.000
8.500	8.500	7.722	5.000	0.000
8.600	8.600	7.722	5.000	0.000
8.700	8.700	7.722	5.000	0.000
8.800	8.800	7.722	5.000	0.000
8.900	8.900	7.722	5.000	0.000
9.000	9.000	7.722	5.000	0.000
9.100	9.100	7.722	5.000	0.000
9.200	9.200	7.722	5.000	0.000
9.300	9.300	7.722	5.000	0.000
9.400	9.400	7.722	5.000	0.000
9.500	9.500	7.722	5.000	0.000
9.530	9.530	7.722	5.000	0.000

FOR THE DISCHARGE AT THE END OF SEGMENT 1
DISCHARGER = LAWRENCEVILLE STP (VA0020354)
FLOW = 1.2 MGD cBOD5 = 10 Mg/L TKN = 3 Mg/L D.O. = 6.5 Mg/L

FLOW FROM INCREMENTAL DRAINAGE AREA = 0.2735 MGD

********** RESPONSE FOR SEGMENT 2 **********

TOTAL STREAMFLOW = 1.6001 MGD
(Including Discharge, Tributaries and Incremental D.A. Flow)

DISTANCE FROM HEAD OF SEGMENT (MI.)	TOTAL DISTANCE FROM MODEL BEGINNING (MI.)	DISSOLVED OXYGEN (Mg/L)	cBODu (Mg/L)	nBODu (Mg/L)
0.000	9.530	6.806	19.999	0.000
0.100	9.630	6.738	19.814	0.000
0.200	9.730	6.676	19.631	0.000
0.300	9.830	6.619	19.450	0.000

FOR THE TRIBUTARY AT THE END OF SEGMENT 2
FLOW = .5 MGD cBOD5 = 2 Mg/L TKN = 0 Mg/L D.O. = 7.74 Mg/L

FLOW FROM INCREMENTAL DRAINAGE AREA = 0.0008 MGD

********** RESPONSE FOR SEGMENT 3 **********

TOTAL STREAMFLOW = 2.1009 MGD
(Including Discharge, Tributaries and Incremental D.A. Flow)

DISTANCE FROM HEAD OF SEGMENT (MI.)	TOTAL DISTANCE FROM MODEL BEGINNING (MI.)	DISSOLVED OXYGEN (Mg/L)	cBODu (Mg/L)	nBODu (Mg/L)
0.000	9.830	6.886	16.005	0.000
0.100	9.930	6.781	15.847	0.000
0.200	10.030	6.680	15.690	0.000
0.300	10.130	6.583	15.535	0.000
0.400	10.230	6.491	15.381	0.000
0.500	10.330	6.403	15.229	0.000
0.600	10.430	6.319	15.078	0.000
0.700	10.530	6.239	14.929	0.000
0.800	10.630	6.163	14.781	0.000
0.900	10.730	6.091	14.635	0.000
1.000	10.830	6.022	14.490	0.000
1.100	10.930	5.956	14.347	0.000
1.200	11.030	5.894	14.205	0.000
1.300	11.130	5.835	14.064	0.000
1.400	11.230	5.779	13.925	0.000
1.500	11.330	5.726	13.787	0.000
1.600	11.430	5.676	13.650	0.000
1.700	11.530	5.629	13.515	0.000
1.800	11.630	5.585	13.382	0.000
1.900	11.730	5.543	13.249	0.000
2.000	11.830	5.504	13.118	0.000
2.100	11.930	5.467	12.988	0.000
2.200	12.030	5.432	12.859	0.000
2.300	12.130	5.400	12.732	0.000
2.400	12.230	5.370	12.606	0.000
2.500	12.330	5.342	12.481	0.000
2.600	12.430	5.316	12.358	0.000
2.700	12.530	5.292	12.236	0.000
2.800	12.630	5.270	12.115	0.000
2.900	12.730	5.250	11.995	0.000
3.000	12.830	5.231	11.876	0.000
3.100	12.930	5.214	11.758	0.000
3.200	13.030	5.199	11.642	0.000
3.300	13.130	5.186	11.527	0.000
3.400	13.230	5.174	11.413	0.000
3.500	13.330	5.163	11.300	0.000
3.600	13.430	5.154	11.188	0.000
3.700	13.530	5.146	11.077	0.000
3.800	13.630	5.140	10.968	0.000
3.900	13.730	5.134	10.859	0.000
4.000	13.830	5.130	10.752	0.000
4.100	13.930	5.128	10.645	0.000
4.200	14.030	5.126	10.540	0.000
4.300	14.130	5.125	10.435	0.000
4.400	14.230	5.126	10.332	0.000
4.500	14.330	5.127	10.230	0.000
4.600	14.430	5.129	10.128	0.000

GREAT CREEK SALT

FOR THE TRIBUTARY AT THE END OF SEGMENT 3
FLOW = 10.67 MGD cBOD5 = 2 Mg/L TKN = 0 Mg/L D.O. = 7.7434 Mg/L

FLOW FROM INCREMENTAL DRAINAGE AREA = 0.1253 MGD

********** RESPONSE FOR SEGMENT 4 **********

TOTAL STREAMFLOW = 12.8962 MGD
(Including Discharge, Tributaries and Incremental D.A. Flow)

DISTANCE FROM HEAD OF SEGMENT (MI.)	TOTAL DISTANCE FROM MODEL BEGINNING (MI.)	DISSOLVED OXYGEN (Mg/L)	cBODu (Mg/L)	nBODu (Mg/L)
0.000	14.430	7.318	5.835	0.000
0.100	14.530	7.275	5.778	0.000
0.200	14.630	7.233	5.722	0.000
0.300	14.730	7.193	5.666	0.000
0.400	14.830	7.153	5.610	0.000
0.500	14.930	7.115	5.555	0.000
0.600	15.030	7.077	5.501	0.000
0.700	15.130	7.040	5.447	0.000
0.800	15.230	7.005	5.394	0.000
0.900	15.330	6.970	5.341	0.000
1.000	15.430	6.936	5.289	0.000
1.100	15.530	6.903	5.237	0.000
1.200	15.630	6.871	5.186	0.000
1.300	15.730	6.839	5.135	0.000
1.400	15.830	6.809	5.084	0.000
1.500	15.930	6.779	5.035	0.000
1.600	16.030	6.751	5.000	0.000
1.700	16.130	6.771	5.000	0.000
1.800	16.230	6.791	5.000	0.000
1.900	16.330	6.811	5.000	0.000
2.000	16.430	6.831	5.000	0.000
2.100	16.530	6.851	5.000	0.000
2.200	16.630	6.870	5.000	0.000
2.300	16.730	6.889	5.000	0.000
2.400	16.830	6.908	5.000	0.000
2.500	16.930	6.927	5.000	0.000
2.600	17.030	6.946	5.000	0.000
2.700	17.130	6.964	5.000	0.000
2.800	17.230	6.982	5.000	0.000
2.900	17.330	7.000	5.000	0.000
3.000	17.430	7.018	5.000	0.000
3.100	17.530	7.035	5.000	0.000
3.200	17.630	7.053	5.000	0.000
3.300	17.730	7.070	5.000	0.000
3.400	17.830	7.087	5.000	0.000
3.500	17.930	7.104	5.000	0.000
3.600	18.030	7.120	5.000	0.000
3.700	18.130	7.137	5.000	0.000
3.800	18.230	7.153	5.000	0.000
3.900	18.330	7.169	5.000	0.000
4.000	18.430	7.185	5.000	0.000
4.100	18.530	7.201	5.000	0.000
4.200	18.630	7.216	5.000	0.000
4.300	18.730	7.232	5.000	0.000
4.400	18.830	7.247	5.000	0.000
4.500	18.930	7.262	5.000	0.000
4.600	19.030	7.277	5.000	0.000
4.700	19.130	7.291	5.000	0.000

MEHERRIN RIVER SAG

D.O. > 5.576 O.K.

4.800	19.330	7.306	5.000	0.000
4.900	19.330	7.320	5.000	0.000
5.000	19.430	7.334	5.000	0.000

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REGIONAL MODELING SYSTEM Ver 3.2 (OWRM - 9/90)
04-10-1996 16:20:42

DATA FILE = ALBERTA.MOD

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REGIONAL MODELING SYSTEM VERSION 3.2

DATA FILE SUMMARY

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THE NAME OF THE DATA FILE IS: ALBERTA.MOD

THE STREAM NAME IS: ROSES CREEK -> GREAT CREEK -> MEHERRIN RIVER
THE RIVER BASIN IS: CHOWAN (MEHERRIN)
THE SECTION NUMBER IS: 3
THE CLASSIFICATION IS: III

STANDARDS VIOLATED (Y/N) = N
STANDARDS APPROPRIATE (Y/N) = Y

DISCHARGE WITHIN 3 MILES (Y/N) = N

THE DISCHARGE BEING MODELED IS: ALBERTA STP (VA0026816)

PROPOSED LIMITS ARE:
FLOW = .1 MGD
BOD5 = 12 MG/L
TKN = 3 MG/L
D.O. = 6.5 MG/L

THE NUMBER OF SEGMENTS TO BE MODELED = 4

7Q10 WILL BE CALCULATED BY: DRAINAGE AREA COMPARISON
THE GAUGE NAME IS: VDEQ #02051600 (GREAT CREEK AT RTE. 618 BRIDGE)
GAUGE DRAINAGE AREA = 30.7 SQ.MI.
GAUGE 7Q10 = .336 MGD
DRAINAGE AREA AT DISCHARGE = 2.43 SQ.MI.

STREAM A DRY DITCH AT DISCHARGE (Y/N) = N
ANTIDEGRADATION APPLIES (Y/N) = N

ALLOCATION DESIGN TEMPERATURE = 22.8 °C

SEGMENT INFORMATION

####### SEGMENT # 1 #######

SEGMENT ENDS BECAUSE: A DISCHARGE ENTERS AT END

SEGMENT LENGTH = 9.53 MI

SEGMENT WIDTH = 1 FT
SEGMENT DEPTH = .17 FT
SEGMENT VELOCITY = .63 FT/SEC

DRAINAGE AREA AT SEGMENT START = 2.43 SQ.MI.
DRAINAGE AREA AT SEGMENT END = 27.42 SQ.MI.

ELEVATION AT UPSTREAM END = 289.5 FT
ELEVATION AT DOWNSTREAM END = 162.3 FT

THE CROSS SECTION IS: RECTANGULAR
THE CHANNEL IS: MODERATELY MEANDERING

POOLS AND RIFFLES (Y/N) = N

THE BOTTOM TYPE = SAND
SLUDGE DEPOSITS = NONE
AQUATIC PLANTS = NONE
ALGAE OBSERVED = NONE
WATER COLORED GREEN (Y/N) = N

THE DISCHARGE AT THE SEGMENT END IS: LAWRENCEVILLE STP (VA0020354)

ITS CONCENTRATIONS ARE:
FLOW = 1.2 MGD
BOD5 = 10 MG/L
TKN = 3 MG/L
D.O. = 6.5 MG/L

SEGMENT INFORMATION

####### SEGMENT # 2 #######

SEGMENT ENDS BECAUSE: A TRIBUTARY ENTERS AT END

SEGMENT LENGTH = .3 MI

SEGMENT WIDTH = 5 FT
SEGMENT DEPTH = .6 FT
SEGMENT VELOCITY = .75 FT/SEC

DRAINAGE AREA AT SEGMENT START = 27.42 SQ.MI.
DRAINAGE AREA AT SEGMENT END = 27.49 SQ.MI.

ELEVATION AT UPSTREAM END = 162.3 FT
ELEVATION AT DOWNSTREAM END = 159 FT

THE CROSS SECTION IS: RECTANGULAR
THE CHANNEL IS: MODERATELY MEANDERING

POOLS AND RIFFLES (Y/N) = N

THE BOTTOM TYPE = SAND
SLUDGE DEPOSITS = NONE
AQUATIC PLANTS = NONE
ALGAE OBSERVED = NONE
WATER COLORED GREEN (Y/N) = N

TRIBUTARY DATA
FLOW = .5 MGD
BOD5 = 2 MG/L
TKN = 0 MG/L
D.O. = 7.5085 MG/L

SEGMENT INFORMATION

####### SEGMENT # 3 #######

SEGMENT ENDS BECAUSE: A TRIBUTARY ENTERS AT END

SEGMENT LENGTH = 4.6 MI

SEGMENT WIDTH = 5 FT
SEGMENT DEPTH = .8 FT
SEGMENT VELOCITY = .8 FT/SEC

DRAINAGE AREA AT SEGMENT START = 45.74 SQ.MI.
DRAINAGE AREA AT SEGMENT END = 57.19 SQ.MI.

ELEVATION AT UPSTREAM END = 159 FT
ELEVATION AT DOWNSTREAM END = 137 FT

THE CROSS SECTION IS: RECTANGULAR
THE CHANNEL IS: MODERATELY MEANDERING

POOLS AND RIFFLES (Y/N) = N

THE BOTTOM TYPE = SAND
SLUDGE DEPOSITS = NONE
AQUATIC PLANTS = NONE
ALGAE OBSERVED = NONE
WATER COLORED GREEN (Y/N) = N

TRIBUTARY DATA
FLOW = 10.67 MGD
BOD5 = 2 MG/L
TKN = 0 MG/L
D.O. = 7.5118 MG/L

SEGMENT INFORMATION

####### SEGMENT # 4 #######

SEGMENT ENDS BECAUSE: THE MODEL ENDS

SEGMENT LENGTH = 5 MI

SEGMENT WIDTH = 20 FT
SEGMENT DEPTH = 2 FT
SEGMENT VELOCITY = .5 FT/SEC

DRAINAGE AREA AT SEGMENT START = 653.3 SQ.MI.
DRAINAGE AREA AT SEGMENT END = 740.15 SQ.MI.

ELEVATION AT UPSTREAM END = 137 FT
ELEVATION AT DOWNSTREAM END = 128 FT

THE CROSS SECTION IS: RECTANGULAR
THE CHANNEL IS: MOSTLY STRAIGHT

POOLS AND RIFFLES (Y/N) = N

THE BOTTOM TYPE = SAND
SLUDGE DEPOSITS = NONE
AQUATIC PLANTS = NONE
ALGAE OBSERVED = NONE
WATER COLORED GREEN (Y/N) = N

****

REGIONAL MODELING SYSTEM Ver 3.2 (OWRM - 9/90)
04-10-1996 16:25:20

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REGIONAL MODELING SYSTEM VERSION 3.2

****

MODEL SIMULATION FOR THE ALBERTA STP DISCHARGE

TO ROSES CREEK

COMMENT: BASELINE MODEL

THE SIMULATION STARTS AT THE ALBERTA STP DISCHARGE

********** PROPOSED PERMIT LIMITS **********

FLOW = .1 MGD cBOD5 = 25 Mg/L TKN = 20 Mg/L D.O. = 5 Mg/L

**** THE MAXIMUM CHLORINE ALLOWABLE IN THE DISCHARGE IS 0.014 Mg/L ****

THE SECTION BEING MODELED IS BROKEN INTO 4 SEGMENTS
RESULTS WILL BE GIVEN AT 0.1 MILE INTERVALS

********** BACKGROUND CONDITIONS **********

THE 7Q10 STREAM FLOW AT THE DISCHARGE IS 0.02660 MGD
THE DISSOLVED OXYGEN OF THE STREAM IS 7.722 Mg/L
THE BACKGROUND cBODu OF THE STREAM IS 5 Mg/L
THE BACKGROUND nBOD OF THE STREAM IS 0 Mg/L

********** MODEL PARAMETERS **********

SEG.	LEN. Mi	VEL. F/S	K2 1/D	K1 1/D	KN 1/D	BENTHIC Mg/L	ELEV. Ft	TEMP. °C	DO-SAT Mg/L
1	9.53	0.450	8.008	1.600	0.550	0.000	225.90	22.80	8.580
2	0.30	0.674	6.600	1.100	0.350	0.000	160.65	22.80	8.620
3	4.60	0.629	2.870	1.100	0.350	0.000	148.00	22.30	8.664
4	5.00	0.535	1.080	1.100	0.350	0.000	132.50	22.30	8.693

(The K Rates shown are at 20°C ... the model corrects them for temperature.)

********** RESPONSE FOR SEGMENT 1 **********

TOTAL STREAMFLOW = 0.1266 MGD
(Including Discharge)

DISTANCE FROM HEAD OF SEGMENT (MI.)	TOTAL DISTANCE FROM MODEL BEGINNING (MI.)	DISSOLVED OXYGEN (Mg/L)	cBODu (Mg/L)	nBODu (Mg/L)
0.000	0.000	5.572	50.420	58.146
0.100	0.100	4.234	49.189	57.609
0.200	0.200	3.075	47.988	57.078
0.300	0.300	2.076	46.816	56.551
0.400	0.400	1.219	45.673	56.029
0.500	0.500	0.486	44.557	55.512
0.600	0.600	0.000	43.469	55.000
0.700	0.700	0.000	42.408	54.493
0.800	0.800	0.000	41.372	53.990
0.900	0.900	0.000	40.362	53.492
1.000	1.000	0.000	39.376	52.998
1.100	1.100	0.000	38.415	52.509
1.200	1.200	0.000	37.476	52.025
1.300	1.300	0.000	36.561	51.544
1.400	1.400	0.000	35.668	51.069
1.500	1.500	0.000	34.797	50.598
1.600	1.600	0.000	33.948	50.131
1.700	1.700	0.000	33.119	49.668
1.800	1.800	0.000	32.310	49.210
1.900	1.900	0.000	31.521	48.756
2.000	2.000	0.000	30.751	48.306
2.100	2.100	0.000	30.000	47.860
2.200	2.200	0.000	29.267	47.419
2.300	2.300	0.000	28.553	46.981
2.400	2.400	0.000	27.855	46.548
2.500	2.500	0.000	27.175	46.118
2.600	2.600	0.000	26.512	45.693
2.700	2.700	0.000	25.864	45.271
2.800	2.800	0.000	25.233	44.853
2.900	2.900	0.000	24.616	44.439
3.000	3.000	0.000	24.015	44.029
3.100	3.100	0.005	23.429	43.623
3.200	3.200	0.026	22.857	43.220
3.300	3.300	0.062	22.299	42.822
3.400	3.400	0.110	21.754	42.426
3.500	3.500	0.169	21.223	42.035
3.600	3.600	0.237	20.705	41.647
3.700	3.700	0.313	20.199	41.263
3.800	3.800	0.396	19.706	40.882
3.900	3.900	0.484	19.224	40.505
4.000	4.000	0.577	18.755	40.131
4.100	4.100	0.674	18.297	39.761
4.200	4.200	0.774	17.850	39.394
4.300	4.300	0.876	17.414	39.030
4.400	4.400	0.980	16.989	38.670
4.500	4.500	1.086	16.574	38.313
4.600	4.600	1.193	16.169	37.960
4.700	4.700	1.301	15.774	37.610
4.800	4.800	1.409	15.389	37.263
4.900	4.900	1.517	15.013	36.919
5.000	5.000	1.625	14.647	36.578
5.100	5.100	1.732	14.289	36.241
5.200	5.200	1.839	13.940	35.906
5.300	5.300	1.945	13.600	35.575

5.400	5.400	2.050	13.268	35.247
5.500	5.500	2.154	12.944	34.921
5.600	5.600	2.257	12.628	34.599
5.700	5.700	2.359	12.319	34.280
5.800	5.800	2.459	12.018	33.964
5.900	5.900	2.558	11.725	33.650
6.000	6.000	2.656	11.439	33.340
6.100	6.100	2.752	11.159	33.032
6.200	6.200	2.847	10.887	32.727
6.300	6.300	2.941	10.621	32.425
6.400	6.400	3.033	10.361	32.126
6.500	6.500	3.123	10.108	31.830
6.600	6.600	3.212	9.862	31.536
6.700	6.700	3.299	9.621	31.245
6.800	6.800	3.385	9.386	30.957
6.900	6.900	3.469	9.157	30.671
7.000	7.000	3.552	8.933	30.388
7.100	7.100	3.634	8.715	30.108
7.200	7.200	3.714	8.502	29.830
7.300	7.300	3.792	8.295	29.555
7.400	7.400	3.869	8.092	29.282
7.500	7.500	3.945	7.894	29.012
7.600	7.600	4.019	7.701	28.744
7.700	7.700	4.092	7.513	28.479
7.800	7.800	4.163	7.330	28.216
7.900	7.900	4.234	7.151	27.955
8.000	8.000	4.302	6.976	27.698
8.100	8.100	4.370	6.806	27.442
8.200	8.200	4.436	6.640	27.189
8.300	8.300	4.501	6.478	26.938
8.400	8.400	4.565	6.319	26.689
8.500	8.500	4.628	6.165	26.443
8.600	8.600	4.689	6.015	26.199
8.700	8.700	4.750	5.868	25.957
8.800	8.800	4.809	5.724	25.718
8.900	8.900	4.867	5.584	25.480
9.000	9.000	4.924	5.448	25.245
9.100	9.100	4.980	5.315	25.012
9.200	9.200	5.035	5.185	24.782
9.300	9.300	5.089	5.059	24.553
9.400	9.400	5.141	5.000	24.326
9.500	9.500	5.307	5.000	24.102
9.530	9.530	5.353	5.000	24.035

THE STANDARDS ARE VIOLATED IN THIS SEGMENT

FOR THE DISCHARGE AT THE END OF SEGMENT 1
DISCHARGER = LAWRENCEVILLE STP
FLOW = .6 MGD cBOD5 = 25 Mg/L TKN = 20 Mg/L D.O. = 6.5 Mg/L

FLOW FROM INCREMENTAL DRAINAGE AREA = 0.2735 MGD

********** RESPONSE FOR SEGMENT 2 **********

TOTAL STREAMFLOW = 1.0001 MGD
(Including Discharge, Tributaries and Incremental D.A. Flow)

DISTANCE FROM HEAD OF SEGMENT (MI.)	TOTAL DISTANCE FROM MODEL BEGINNING (MI.)	DISSOLVED OXYGEN (Mg/L)	cBODu (Mg/L)	nBODu (Mg/L)
0.000	9.530	6.689	39.496	47.204
0.100	9.630	6.196	39.051	47.018
0.200	9.730	5.739	38.610	46.833
0.300	9.830	5.316	38.174	46.649

FOR THE TRIBUTARY AT THE END OF SEGMENT 2
FLOW = .5 MGD cBOD5 = 2 Mg/L TKN = 0 Mg/L D.O. = 7.74 Mg/L

FLOW FROM INCREMENTAL DRAINAGE AREA = 0.0008 MGD

********** RESPONSE FOR SEGMENT 3 **********

TOTAL STREAMFLOW = 1.5009 MGD
(Including Discharge, Tributaries and Incremental D.A. Flow)

DISTANCE FROM HEAD OF SEGMENT (MI.)	TOTAL DISTANCE FROM MODEL BEGINNING (MI.)	DISSOLVED OXYGEN (Mg/L)	cBODu (Mg/L)	nBODu (Mg/L)
0.000	9.830	6.135	27.106	31.085
0.100	9.930	5.746	26.778	30.954
0.200	10.030	5.383	26.455	30.824
0.300	10.130	5.035	26.135	30.694
0.400	10.230	4.701	25.819	30.565
0.500	10.330	4.381	25.507	30.436
0.600	10.430	4.075	25.199	30.308
0.700	10.530	3.783	24.894	30.180
0.800	10.630	3.503	24.594	30.053
0.900	10.730	3.235	24.296	29.927
1.000	10.830	2.979	24.003	29.801
1.100	10.930	2.735	23.713	29.675
1.200	11.030	2.502	23.426	29.550
1.300	11.130	2.279	23.143	29.426
1.400	11.230	2.068	22.863	29.302
1.500	11.330	1.866	22.587	29.178
1.600	11.430	1.674	22.314	29.055
1.700	11.530	1.491	22.044	28.933
1.800	11.630	1.317	21.778	28.811
1.900	11.730	1.153	21.515	28.690
2.000	11.830	0.996	21.255	28.569
2.100	11.930	0.849	20.998	28.449
2.200	12.030	0.709	20.744	28.329
2.300	12.130	0.575	20.493	28.210
2.400	12.230	0.450	20.246	28.091
2.500	12.330	0.332	20.001	27.973
2.600	12.430	0.220	19.759	27.855
2.700	12.530	0.116	19.521	27.738
2.800	12.630	0.018	19.285	27.621
2.900	12.730	0.000	19.052	27.504
3.000	12.830	0.000	18.822	27.389
3.100	12.930	0.000	18.594	27.273
3.200	13.030	0.000	18.369	27.159
3.300	13.130	0.000	18.147	27.044
3.400	13.230	0.000	17.928	26.930
3.500	13.330	0.000	17.712	26.817
3.600	13.430	0.000	17.497	26.704
3.700	13.530	0.000	17.286	26.592
3.800	13.630	0.000	17.077	26.480
3.900	13.730	0.000	16.871	26.368
4.000	13.830	0.000	16.667	26.257
4.100	13.930	0.000	16.465	26.146
4.200	14.030	0.000	16.265	26.036
4.300	14.130	0.000	16.067	25.927
4.400	14.230	0.000	15.872	25.818
4.500	14.330	0.000	15.679	25.709
4.600	14.430	0.000	15.488	25.601

THE STANDARDS ARE VIOLATED IN THIS SEGMENT

FOR THE TRIBUTARY AT THE END OF SEGMENT 3
FLOW = 10.67 MGD cBOD5 = 2 Mg/L TKN = 0 Mg/L D.O. = 7.7434 Mg/L

FLOW FROM INCREMENTAL DRAINAGE AREA = 0.1253 MGD

********** RESPONSE FOR SEGMENT 4 **********

TOTAL STREAMFLOW = 12.2962 MGD
(Including Discharge, Tributaries and Incremental D.A. Flow)

DISTANCE FROM HEAD OF SEGMENT (MI.)	TOTAL DISTANCE FROM MODEL BEGINNING (MI.)	DISSOLVED OXYGEN (Mg/L)	cBODu (Mg/L)	nBODu (Mg/L)
0.000	14.430	6.798	6.281	3.125
0.100	14.530	6.731	6.206	3.112
0.200	14.630	6.665	6.132	3.099
0.300	14.730	6.600	6.058	3.086
0.400	14.830	6.538	5.986	3.073
0.500	14.930	6.477	5.914	3.060
0.600	15.030	6.417	5.844	3.047
0.700	15.130	6.359	5.774	3.035
0.800	15.230	6.303	5.705	3.022
0.900	15.330	6.248	5.636	3.010
1.000	15.430	6.195	5.569	2.997
1.100	15.530	6.143	5.503	2.985
1.200	15.630	6.092	5.437	2.972
1.300	15.730	6.043	5.372	2.960
1.400	15.830	5.995	5.307	2.947
1.500	15.930	5.949	5.244	2.935
1.600	16.030	5.904	5.181	2.923
1.700	16.130	5.860	5.120	2.911
1.800	16.230	5.817	5.058	2.899
1.900	16.330	5.776	5.000	2.887
2.000	16.430	5.795	5.000	2.875
2.100	16.530	5.814	5.000	2.863
2.200	16.630	5.833	5.000	2.851
2.300	16.730	5.852	5.000	2.839
2.400	16.830	5.871	5.000	2.827
2.500	16.930	5.889	5.000	2.815
2.600	17.030	5.907	5.000	2.803
2.700	17.130	5.926	5.000	2.792
2.800	17.230	5.944	5.000	2.780
2.900	17.330	5.962	5.000	2.769
3.000	17.430	5.979	5.000	2.757
3.100	17.530	5.997	5.000	2.746
3.200	17.630	6.014	5.000	2.734
3.300	17.730	6.031	5.000	2.723
3.400	17.830	6.049	5.000	2.711
3.500	17.930	6.066	5.000	2.700
3.600	18.030	6.083	5.000	2.689
3.700	18.130	6.099	5.000	2.678
3.800	18.230	6.116	5.000	2.667
3.900	18.330	6.132	5.000	2.655
4.000	18.430	6.149	5.000	2.644
4.100	18.530	6.165	5.000	2.633
4.200	18.630	6.181	5.000	2.622
4.300	18.730	6.197	5.000	2.612
4.400	18.830	6.213	5.000	2.601
4.500	18.930	6.228	5.000	2.590
4.600	19.030	6.244	5.000	2.579
4.700	19.130	6.259	5.000	2.568

BASELINE SAG

ALLOWABLE DO IN MEHERRIN WITHOUT VIOLATING ANTIDEGRADAT

DO = 5.576

4.800	19.230	6.275	5.000	2.558
4.900	19.330	6.290	5.000	2.547
5.000	19.430	6.305	5.000	2.536

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REGIONAL MODELING SYSTEM Ver 3.2 (OWRM - 9/90)
04-10-1996 16:28:16

DATA FILE = ALBRTBAS.MOD

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REGIONAL MODELING SYSTEM VERSION 3.2

DATA FILE SUMMARY

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THE NAME OF THE DATA FILE IS: ALBRTBAS.MOD

THE STREAM NAME IS: ROSES CREEK
THE RIVER BASIN IS: CHOWAN (MEHERRIN)
THE SECTION NUMBER IS: 3
THE CLASSIFICATION IS: III

STANDARDS VIOLATED (Y/N) = N
STANDARDS APPROPRIATE (Y/N) = Y

DISCHARGE WITHIN 3 MILES (Y/N) = N

THE DISCHARGE BEING MODELED IS: ALBERTA STP

PROPOSED LIMITS ARE:
FLOW = .1 MGD
BOD5 = 25 MG/L
TKN = 20 MG/L
D.O. = 5 MG/L

THE NUMBER OF SEGMENTS TO BE MODELED = 4

7Q10 WILL BE CALCULATED BY: DRAINAGE AREA COMPARISON
THE GAUGE NAME IS: VDEQ #02051600
GAUGE DRAINAGE AREA = 30.7 SQ.MI.
GAUGE 7Q10 = .336 MGD
DRAINAGE AREA AT DISCHARGE = 2.43 SQ.MI.

STREAM A DRY DITCH AT DISCHARGE (Y/N) = N
ANTIDEGRADATION APPLIES (Y/N) = N

ALLOCATION DESIGN TEMPERATURE = 22.8 °C

SEGMENT INFORMATION

####### SEGMENT # 1 #######

SEGMENT ENDS BECAUSE: A DISCHARGE ENTERS AT END

SEGMENT LENGTH = 9.53 MI

SEGMENT WIDTH = 1 FT
SEGMENT DEPTH = .17 FT
SEGMENT VELOCITY = .63 FT/SEC

DRAINAGE AREA AT SEGMENT START = 2.43 SQ.MI.
DRAINAGE AREA AT SEGMENT END = 27.42 SQ.MI.

ELEVATION AT UPSTREAM END = 289.5 FT
ELEVATION AT DOWNSTREAM END = 162.3 FT

THE CROSS SECTION IS: RECTANGULAR
THE CHANNEL IS: MODERATELY MEANDERING

POOLS AND RIFFLES (Y/N) = N

THE BOTTOM TYPE = SAND
SLUDGE DEPOSITS = NONE
AQUATIC PLANTS = NONE
ALGAE OBSERVED = NONE
WATER COLORED GREEN (Y/N) = N

THE DISCHARGE AT THE SEGMENT END IS: LAWRENCEVILLE STP

ITS CONCENTRATIONS ARE:
FLOW = .6 MGD
BOD5 = 25 MG/L
TKN = 20 MG/L
D.O. = 6.5 MG/L

SEGMENT INFORMATION

####### SEGMENT # 2 #######

SEGMENT ENDS BECAUSE: A TRIBUTARY ENTERS AT END

SEGMENT LENGTH = .3 MI

SEGMENT WIDTH = 5 FT
SEGMENT DEPTH = .6 FT
SEGMENT VELOCITY = .75 FT/SEC

DRAINAGE AREA AT SEGMENT START = 27.42 SQ.MI.
DRAINAGE AREA AT SEGMENT END = 27.49 SQ.MI.

ELEVATION AT UPSTREAM END = 162.3 FT
ELEVATION AT DOWNSTREAM END = 159 FT

THE CROSS SECTION IS: RECTANGULAR
THE CHANNEL IS: MODERATELY MEANDERING

POOLS AND RIFFLES (Y/N) = N

THE BOTTOM TYPE = SAND
SLUDGE DEPOSITS = NONE
AQUATIC PLANTS = NONE
ALGAE OBSERVED = NONE
WATER COLORED GREEN (Y/N) = N

TRIBUTARY DATA
FLOW = .5 MGD
BOD5 = 2 MG/L
TKN = 0 MG/L
D.O. = 7.5085 MG/L

SEGMENT INFORMATION

####### SEGMENT # 3 #######

SEGMENT ENDS BECAUSE: A TRIBUTARY ENTERS AT END

SEGMENT LENGTH = 4.6 MI

SEGMENT WIDTH = 5 FT
SEGMENT DEPTH = .8 FT
SEGMENT VELOCITY = .8 FT/SEC

DRAINAGE AREA AT SEGMENT START = 45.74 SQ.MI.
DRAINAGE AREA AT SEGMENT END = 57.19 SQ.MI.

ELEVATION AT UPSTREAM END = 159 FT
ELEVATION AT DOWNSTREAM END = 137 FT

THE CROSS SECTION IS: RECTANGULAR
THE CHANNEL IS: MODERATELY MEANDERING

POOLS AND RIFFLES (Y/N) = N

THE BOTTOM TYPE = SAND
SLUDGE DEPOSITS = NONE
AQUATIC PLANTS = NONE
ALGAE OBSERVED = NONE
WATER COLORED GREEN (Y/N) = N

TRIBUTARY DATA
FLOW = 10.67 MGD
BOD5 = 2 MG/L
TKN = 0 MG/L
D.O. = 7.5118 MG/L

SEGMENT INFORMATION

####### SEGMENT # 4 #######

SEGMENT ENDS BECAUSE: THE MODEL ENDS

SEGMENT LENGTH = 5 MI

SEGMENT WIDTH = 20 FT
SEGMENT DEPTH = 2 FT
SEGMENT VELOCITY = .5 FT/SEC

DRAINAGE AREA AT SEGMENT START = 653.3 SQ.MI.
DRAINAGE AREA AT SEGMENT END = 740.15 SQ.MI.

ELEVATION AT UPSTREAM END = 137 FT
ELEVATION AT DOWNSTREAM END = 128 FT

THE CROSS SECTION IS: RECTANGULAR
THE CHANNEL IS: MOSTLY STRAIGHT

POOLS AND RIFFLES (Y/N) = N

THE BOTTOM TYPE = SAND
SLUDGE DEPOSITS = NONE
AQUATIC PLANTS = NONE
ALGAE OBSERVED = NONE
WATER COLORED GREEN (Y/N) = N

****

REGIONAL MODELING SYSTEM Ver 3.2 (OWRM - 9/90)
04-10-1996 16:32:43

JAN - APRIL

****

REGIONAL MODELING SYSTEM VERSION 3.2

****

MODEL SIMULATION FOR THE ALBERTA STP (VA0026816) DISCHARGE

TO ROSES CREEK-> GREAT CREEK-> MEHERRIN RIVER

COMMENT: HIGH FLOW RELIEF CONDITIONS (JAN - APRIL)

THE SIMULATION STARTS AT THE ALBERTA STP (VA0026816) DISCHARGE

********** PROPOSED PERMIT LIMITS **********

FLOW = .1 MGD cBOD5 = 25 Mg/L TKN = 20 Mg/L D.O. = 5 Mg/L

**** THE MAXIMUM CHLORINE ALLOWABLE IN THE DISCHARGE IS 0.055 Mg/L ****

THE SECTION BEING MODELED IS BROKEN INTO 4 SEGMENTS
RESULTS WILL BE GIVEN AT 0.1 MILE INTERVALS

********** BACKGROUND CONDITIONS **********

THE 7Q10 STREAM FLOW AT THE DISCHARGE IS 0.39893 MGD
THE DISSOLVED OXYGEN OF THE STREAM IS 9.517 Mg/L
THE BACKGROUND cBODu OF THE STREAM IS 5 Mg/L
THE BACKGROUND nBOD OF THE STREAM IS 0 Mg/L

********** MODEL PARAMETERS **********

SEG.	LEN. Mi	VEL. F/S	K2 1/D	K1 1/D	KN 1/D	BENTHIC Mg/L	ELEV. Ft	TEMP. °C	DO-SAT Mg/L
1	9.53	0.701	8.008	1.700	0.650	0.000	225.90	12.40	10.575
2	0.30	0.802	6.600	0.700	0.250	0.000	160.65	12.40	10.599
3	4.60	0.849	2.870	1.200	0.450	0.000	148.00	12.40	10.604
4	5.00	1.226	1.080	1.200	0.450	0.000	132.50	12.40	10.609

(The K Rates shown are at 20°C ... the model corrects them for temperature.)

********** RESPONSE FOR SEGMENT 1 **********

TOTAL STREAMFLOW = 0.4989 MGD
(Including Discharge)

DISTANCE FROM HEAD OF SEGMENT (MI.)	TOTAL DISTANCE FROM MODEL BEGINNING (MI.)	DISSOLVED OXYGEN (Mg/L)	cBODu (Mg/L)	nBODu (Mg/L)	
0.000	0.000	8.612	16.525	14.753	
0.100	0.100	8.511	16.353	14.707	
0.200	0.200	8.417	16.183	14.661	
0.300	0.300	8.331	16.014	14.614	
0.400	0.400	8.252	15.848	14.568	
0.500	0.500	8.178	15.683	14.522	
0.600	0.600	8.111	15.520	14.477	
0.700	0.700	8.050	15.358	14.431	
0.800	0.800	7.993	15.199	14.385	
0.900	0.900	7.942	15.040	14.340	
1.000	1.000	7.895	14.884	14.295	
1.100	1.100	7.853	14.729	14.250	
1.200	1.200	7.814	14.576	14.205	
1.300	1.300	7.780	14.424	14.160	
1.400	1.400	7.749	14.274	14.116	
1.500	1.500	7.722	14.126	14.071	
1.600	1.600	7.698	13.979	14.027	
1.700	1.700	7.676	13.834	13.982	
1.800	1.800	7.658	13.690	13.938	
1.900	1.900	7.642	13.547	13.894	
2.000	2.000	7.629	13.406	13.851	
2.100	2.100	7.618	13.267	13.807	
2.200	2.200	7.609	13.129	13.763	
2.300	2.300	7.602	12.992	13.720	
2.400	2.400	7.597	12.857	13.677	
2.500	2.500	7.594	12.724	13.634	
2.600	2.600	7.593	12.591	13.591	ROSES CREEK SAG
2.700	2.700	7.593	12.460	13.548	
2.800	2.800	7.594	12.331	13.505	
2.900	2.900	7.597	12.202	13.462	
3.000	3.000	7.601	12.075	13.420	
3.100	3.100	7.607	11.950	13.378	
3.200	3.200	7.613	11.825	13.335	
3.300	3.300	7.621	11.703	13.293	
3.400	3.400	7.629	11.581	13.252	
3.500	3.500	7.638	11.460	13.210	
3.600	3.600	7.648	11.341	13.168	
3.700	1.700	7.659	11.223	13.127	
3.800	3.800	7.671	11.106	13.085	
3.900	1.900	7.683	10.991	13.044	
4.000	4.000	7.696	10.877	13.003	
4.100	4.100	7.709	10.764	12.962	
4.200	4.200	7.723	10.651	12.921	
4.300	4.300	7.737	10.541	12.880	
4.400	4.400	7.752	10.431	12.840	
4.500	4.500	7.767	10.323	12.799	
4.600	4.600	7.783	10.215	12.759	
4.700	4.700	7.799	10.109	12.719	
4.800	4.800	7.815	10.004	12.678	
4.900	4.900	7.831	9.900	12.638	
5.000	5.000	7.848	9.797	12.599	
5.100	5.100	7.865	9.695	12.559	
5.200	5.200	7.882	9.594	12.519	
5.300	5.300	7.899	9.494	12.480	

5.400	5.400	7.917	9.395	12.440
5.500	5.500	7.934	9.388	12.401
5.600	5.600	7.952	9.201	12.362
5.700	5.700	7.970	9.105	12.323
5.800	5.800	7.987	9.010	12.284
5.900	5.900	8.005	8.917	12.245
6.000	6.000	8.023	8.824	12.207
6.100	6.100	8.041	8.732	12.168
6.200	6.200	8.059	8.641	12.130
6.300	6.300	8.077	8.552	12.092
6.400	6.400	8.095	8.462	12.054
6.500	6.500	8.113	8.375	12.016
6.600	6.600	8.131	8.287	11.978
6.700	6.700	8.149	8.201	11.940
6.800	6.800	8.167	8.116	11.902
6.900	6.900	8.185	8.031	11.865
7.000	7.000	8.203	7.948	11.828
7.100	7.100	8.221	7.865	11.790
7.200	7.200	8.238	7.784	11.753
7.300	7.300	8.256	7.702	11.716
7.400	7.400	8.274	7.622	11.679
7.500	7.500	8.291	7.543	11.642
7.600	7.600	8.309	7.465	11.606
7.700	7.700	8.326	7.387	11.569
7.800	7.800	8.344	7.310	11.532
7.900	7.900	8.361	7.234	11.496
8.000	8.000	8.378	7.159	11.460
8.100	8.100	8.395	7.084	11.424
8.200	8.200	8.412	7.011	11.388
8.300	8.300	8.429	6.938	11.352
8.400	8.400	8.445	6.866	11.316
8.500	8.500	8.462	6.794	11.280
8.600	8.600	8.478	6.724	11.245
8.700	8.700	8.495	6.654	11.209
8.800	8.800	8.511	6.584	11.174
8.900	8.900	8.527	6.516	11.139
9.000	9.000	8.543	6.448	11.104
9.100	9.100	8.559	6.381	11.069
9.200	9.200	8.575	6.315	11.034
9.300	9.300	8.590	6.249	10.999
9.400	9.400	8.606	6.184	10.964
9.500	9.500	8.622	6.120	10.930
9.530	9.530	8.626	6.101	10.919

FOR THE DISCHARGE AT THE END OF SEGMENT 1
DISCHARGER = LAWRENCEVILLE STP (VA0020354)
FLOW = 1.2 MGD cBOD5 = 20 Mg/L TKN = 20 Mg/L D.O. = 5 Mg/L

FLOW FROM INCREMENTAL DRAINAGE AREA = 4.1026 MGD

********** RESPONSE FOR SEGMENT 2 **********

TOTAL STREAMFLOW = 5.8015 MGD
(Including Discharge, Tributaries and Incremental D.A. Flow)

DISTANCE FROM HEAD OF SEGMENT (MI.)	TOTAL DISTANCE FROM MODEL BEGINNING (MI.)	DISSOLVED OXYGEN (Mg/L)	cBODu (Mg/L)	nBODu (Mg/L)
0.000	9.530	8.506	14.403	16.165
0.100	9.630	8.522	14.348	16.147
0.200	9.730	8.538	14.295	16.130
0.300	9.830	8.554	14.241	16.113

FOR THE TRIBUTARY AT THE END OF SEGMENT 2
FLOW = 7.51 MGD cBOD5 = 2 Mg/L TKN = 0 Mg/L D.O. = 9.539 Mg/L

FLOW FROM INCREMENTAL DRAINAGE AREA = 0.0115 MGD

********** RESPONSE FOR SEGMENT 3 **********

TOTAL STREAMFLOW = 13.3230 MGD
(Including Discharge, Tributaries and Incremental D.A. Flow)

DISTANCE FROM HEAD OF SEGMENT (MI.)	TOTAL DISTANCE FROM MODEL BEGINNING (MI.)	DISSOLVED OXYGEN (Mg/L)	cBODu (Mg/L)	nBODu (Mg/L)
0.000	9.830	9.110	9.024	7.017
0.100	9.930	9.069	8.969	7.004
0.200	10.030	9.028	8.915	6.991
0.300	10.130	8.989	8.860	6.979
0.400	10.230	8.951	8.807	6.966
0.500	10.330	8.914	8.753	6.953
0.600	10.430	8.877	8.700	6.941
0.700	10.530	8.842	8.647	6.929
0.800	10.630	8.808	8.594	6.916
0.900	10.730	8.774	8.542	6.904
1.000	10.830	8.742	8.490	6.891
1.100	10.930	8.710	8.439	6.879
1.200	11.030	8.679	8.387	6.866
1.300	11.130	8.650	8.337	6.854
1.400	11.230	8.620	8.286	6.841
1.500	11.330	8.592	8.235	6.829
1.600	11.430	8.565	8.185	6.817
1.700	11.530	8.538	8.136	6.805
1.800	11.630	8.512	8.086	6.792
1.900	11.730	8.487	8.037	6.780
2.000	11.830	8.463	7.988	6.768
2.100	11.930	8.439	7.940	6.755
2.200	12.030	8.417	7.892	6.743
2.300	12.130	8.394	7.844	6.731
2.400	12.230	8.373	7.796	6.719
2.500	12.330	8.352	7.749	6.707
2.600	12.430	8.332	7.701	6.695
2.700	12.530	8.312	7.655	6.683
2.800	12.630	8.293	7.608	6.671
2.900	12.730	8.275	7.562	6.659
3.000	12.830	8.258	7.516	6.647
3.100	12.930	8.241	7.470	6.635
3.200	13.030	8.224	7.425	6.623
3.300	13.130	8.208	7.380	6.611
3.400	13.230	8.193	7.335	6.599
3.500	13.330	8.178	7.290	6.587
3.600	13.430	8.164	7.246	6.575
3.700	13.530	8.150	7.202	6.563
3.800	13.630	8.137	7.158	6.551
3.900	13.730	8.125	7.115	6.540
4.000	13.830	8.112	7.072	6.528
4.100	13.930	8.101	7.029	6.516
4.200	14.030	8.090	6.986	6.504
4.300	14.130	8.079	6.943	6.492
4.400	14.230	8.069	6.901	6.481
4.500	14.330	8.059	6.859	6.469
4.600	14.430	8.049	6.818	6.457

GREAT CREEK SAG

FOR THE TRIBUTARY AT THE END OF SEGMENT 3
FLOW = 78.6 MGD cBOD5 = 2 Mg/L TKN = 0 Mg/L D.O. = 9.5432 Mg/L

FLOW FROM INCREMENTAL DRAINAGE AREA = 1.8797 MGD

********** RESPONSE FOR SEGMENT 4 **********

TOTAL STREAMFLOW = 93.8027 MGD
(Including Discharge, Tributaries and Incremental D.A. Flow)

DISTANCE FROM HEAD OF SEGMENT (MI.)	TOTAL DISTANCE FROM MODEL BEGINNING (MI.)	DISSOLVED OXYGEN (Mg/L)	cBODu (Mg/L)	nBODu (Mg/L)
0.000	14.430	9.331	5.258	0.917
0.100	14.530	9.314	5.236	0.916
0.200	14.630	9.296	5.214	0.915
0.300	14.730	9.279	5.192	0.914
0.400	14.830	9.262	5.170	0.913
0.500	14.930	9.245	5.148	0.912
0.600	15.030	9.229	5.127	0.910
0.700	15.130	9.212	5.105	0.909
0.800	15.230	9.196	5.084	0.908
0.900	15.330	9.180	5.062	0.907
1.000	15.430	9.164	5.041	0.906
1.100	15.530	9.148	5.020	0.905
1.200	15.630	9.132	5.000	0.904
1.300	15.730	9.138	5.000	0.903
1.400	15.830	9.143	5.000	0.902
1.500	15.930	9.149	5.000	0.901
1.600	16.030	9.154	5.000	0.900
1.700	16.130	9.160	5.000	0.898
1.800	16.230	9.165	5.000	0.897
1.900	16.330	9.170	5.000	0.896
2.000	16.430	9.176	5.000	0.895
2.100	16.530	9.181	5.000	0.894
2.200	16.630	9.186	5.000	0.893
2.300	16.730	9.191	5.000	0.892
2.400	16.830	9.197	5.000	0.891
2.500	16.930	9.202	5.000	0.890
2.600	17.030	9.207	5.000	0.888
2.700	17.130	9.212	5.000	0.887
2.800	17.230	9.217	5.000	0.886
2.900	17.330	9.223	5.000	0.885
3.000	17.430	9.228	5.000	0.884
3.100	17.530	9.233	5.000	0.883
3.200	17.630	9.238	5.000	0.882
3.300	17.730	9.243	5.000	0.881
3.400	17.830	9.248	5.000	0.880
3.500	17.930	9.253	5.000	0.879
3.600	18.030	9.258	5.000	0.877
3.700	18.130	9.263	5.000	0.876
3.800	18.230	9.268	5.000	0.875
3.900	18.330	9.273	5.000	0.874
4.000	18.430	9.278	5.000	0.873
4.100	18.530	9.283	5.000	0.872
4.200	18.630	9.288	5.000	0.871
4.300	18.730	9.292	5.000	0.870
4.400	18.830	9.297	5.000	0.869
4.500	18.930	9.302	5.000	0.868
4.600	19.030	9.307	5.000	0.867
4.700	19.130	9.311	5.000	0.865

MEHERRIN RIVER SAG

DO > 9.111 → O.K.

4.800	19.239	9.316	5.000	0.864
4.900	19.330	9.321	5.000	0.863
5.000	19.430	9.326	5.000	0.862

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REGIONAL MODELING SYSTEM Ver 1.2 (ORSIM - 9/90)
04-11-1996 07:48:15

DATA FILE = ALBRHIGH.MOD

JAN - APRIL

****

REGIONAL MODELING SYSTEM VERSION 3.2

DATA FILE SUMMARY

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THE NAME OF THE DATA FILE IS: ALBRHIGH.MOD

THE STREAM NAME IS: ROSES CREEK-> GREAT CREEK-> MEHERRIN RIVER
THE RIVER BASIN IS: CHOWAN
THE SECTION NUMBER IS: 3
THE CLASSIFICATION IS: III

STANDARDS VIOLATED (Y/N) = N
STANDARDS APPROPRIATE (Y/N) = Y

DISCHARGE WITHIN 3 MILES (Y/N) = N

THE DISCHARGE BEING MODELED IS: ALBERTA STP (VA0026816)

PROPOSED LIMITS ARE:
FLOW = .1 MGD
BOD5 = 25 MG/L
TKN = 20 MG/L
D.O. = 5 MG/L

THE NUMBER OF SEGMENTS TO BE MODELED = 4

7Q10 WILL BE CALCULATED BY: DRAINAGE AREA COMPARISON
THE GAUGE NAME IS: VDEQ #02015600
GAUGE DRAINAGE AREA = 30.7 SQ.MI.
GAUGE 7Q10 = 5.04 MGD
DRAINAGE AREA AT DISCHARGE = 2.43 SQ.MI.

STREAM A DRY DITCH AT DISCHARGE (Y/N) = N
ANTIDEGRADATION APPLIES (Y/N) = N

ALLOCATION DESIGN TEMPERATURE = 12.4 °C

SEGMENT INFORMATION

####### SEGMENT # 1 #######

SEGMENT ENDS BECAUSE: A DISCHARGE ENTERS AT END

SEGMENT LENGTH = 9.53 MI

SEGMENT WIDTH = 2 FT
SEGMENT DEPTH = .3 FT
SEGMENT VELOCITY = 1 FT/SEC

DRAINAGE AREA AT SEGMENT START = 2.43 SQ.MI.
DRAINAGE AREA AT SEGMENT END = 27.42 SQ.MI.

ELEVATION AT UPSTREAM END = 289.5 FT
ELEVATION AT DOWNSTREAM END = 162.3 FT

THE CROSS SECTION IS: RECTANGULAR
THE CHANNEL IS: MODERATELY MEANDERING

POOLS AND RIFFLES (Y/N) = N

THE BOTTOM TYPE = SAND
SLUDGE DEPOSITS = NONE
AQUATIC PLANTS = NONE
ALGAE OBSERVED = NONE
WATER COLORED GREEN (Y/N) = N

THE DISCHARGE AT THE SEGMENT END IS: LAWRENCEVILLE STP (VA0020354)

ITS CONCENTRATIONS ARE:
FLOW = 1.2 MGD
BOD5 = 20 MG/L
TKN = 20 MG/L
D.O. = 5 MG/L

SEGMENT INFORMATION

####### SEGMENT # 2 #######

SEGMENT ENDS BECAUSE: A TRIBUTARY ENTERS AT END

SEGMENT LENGTH = .3 MI

SEGMENT WIDTH = 9.5 FT
SEGMENT DEPTH = 1 FT
SEGMENT VELOCITY = .75 FT/SEC

DRAINAGE AREA AT SEGMENT START = 27.42 SQ.MI.
DRAINAGE AREA AT SEGMENT END = 27.49 SQ.MI.

ELEVATION AT UPSTREAM END = 162.3 FT
ELEVATION AT DOWNSTREAM END = 159 FT

THE CROSS SECTION IS: RECTANGULAR
THE CHANNEL IS: MODERATELY MEANDERING

POOLS AND RIFFLES (Y/N) = N

THE BOTTOM TYPE = SAND
SLUDGE DEPOSITS = NONE
AQUATIC PLANTS = NONE
ALGAE OBSERVED = NONE
WATER COLORED GREEN (Y/N) = N

TRIBUTARY DATA
FLOW = 7.51 MGD
BOD5 = 2 MG/L
TKN = 0 MG/L
D.O. = 9.539 MG/L

SEGMENT INFORMATION

####### SEGMENT # 3 #######

SEGMENT ENDS BECAUSE: A TRIBUTARY ENTERS AT END

SEGMENT LENGTH = 4.6 MI

SEGMENT WIDTH = 9.5 FT
SEGMENT DEPTH = 1.5 FT
SEGMENT VELOCITY = 1 FT/SEC

DRAINAGE AREA AT SEGMENT START = 45.74 SQ.MI.
DRAINAGE AREA AT SEGMENT END = 57.19 SQ.MI.

ELEVATION AT UPSTREAM END = 159 FT
ELEVATION AT DOWNSTREAM END = 137 FT

THE CROSS SECTION IS: RECTANGULAR
THE CHANNEL IS: MODERATELY MEANDERING

POOLS AND RIFFLES (Y/N) = N

THE BOTTOM TYPE = SAND
SLUDGE DEPOSITS = NONE
AQUATIC PLANTS = NONE
ALGAE OBSERVED = NONE
WATER COLORED GREEN (Y/N) = N

TRIBUTARY DATA
FLOW = 78.6 MGD
BOD5 = 2 MG/L
TKN = 0 MG/L
D.O. = 9.5432 MG/L

SEGMENT INFORMATION

####### SEGMENT # 4 #######

SEGMENT ENDS BECAUSE: THE MODEL ENDS

SEGMENT LENGTH = 5 MI

SEGMENT WIDTH = 30 FT
SEGMENT DEPTH = 2.7 FT
SEGMENT VELOCITY = 1.5 FT/SEC

DRAINAGE AREA AT SEGMENT START = 653.3 SQ.MI.
DRAINAGE AREA AT SEGMENT END = 740.15 SQ.MI.

ELEVATION AT UPSTREAM END = 137 FT
ELEVATION AT DOWNSTREAM END = 128 FT

THE CROSS SECTION IS: RECTANGULAR
THE CHANNEL IS: MOSTLY STRAIGHT

POOLS AND RIFFLES (Y/N) = N

THE BOTTOM TYPE = SAND
SLUDGE DEPOSITS = NONE
AQUATIC PLANTS = NONE
ALGAE OBSERVED = NONE
WATER COLORED GREEN (Y/N) = N

****

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04-11-1996 07:52:56

GH FLOW BASELINE

****

REGIONAL MODELING SYSTEM VERSION 3.2

****

MODEL SIMULATION FOR THE ALBERTA STP (VA0026816) DISCHARGE

TO ROSES CREEK-> GREAT CREEK-> MEHERRIN RIVER

COMMENT: HIGH FLOW/LOW TEMP BASELINE CONDITIONS

THE SIMULATION STARTS AT THE ALBERTA STP (VA0026816) DISCHARGE

********** PROPOSED PERMIT LIMITS **********

FLOW = .1 MGD cBOD5 = 25 Mg/L TKN = 20 Mg/L D.O. = 5 Mg/L

**** THE MAXIMUM CHLORINE ALLOWABLE IN THE DISCHARGE IS 0.055 Mg/L ****

THE SECTION BEING MODELED IS BROKEN INTO 4 SEGMENTS
RESULTS WILL BE GIVEN AT 0.1 MILE INTERVALS

********** BACKGROUND CONDITIONS **********

THE 7Q10 STREAM FLOW AT THE DISCHARGE IS 0.39893 MGD
THE DISSOLVED OXYGEN OF THE STREAM IS 9.517 Mg/L
THE BACKGROUND cBODu OF THE STREAM IS 5 Mg/L
THE BACKGROUND nBOD OF THE STREAM IS 0 Mg/L

********** MODEL PARAMETERS **********

SEG.	LEN. Mi	VEL. F/S	K2 1/D	K1 1/D	KN 1/D	BENTHIC Mg/L	ELEV. Ft	TEMP. °C	DO-SAT Mg/L
1	9.53	0.701	8.008	1.700	0.650	0.000	225.90	12.40	10.575
2	0.30	0.802	6.600	0.700	0.250	0.000	160.65	12.40	10.599
3	4.50	0.849	2.870	1.200	0.450	0.000	148.00	12.40	10.604
4	5.00	1.226	1.080	1.200	0.450	0.000	132.50	12.40	10.609

(The K Rates shown are at 20°C ... the model corrects them for temperature.)

********** RESPONSE FOR SEGMENT 1 **********

TOTAL STREAMFLOW = 0.4989 MGD
(Including Discharge)

DISTANCE FROM HEAD OF SEGMENT (MI.)	TOTAL DISTANCE FROM MODEL BEGINNING (MI.)	DISSOLVED OXYGEN (Mg/L)	cBODu (Mg/L)	nBODu (Mg/L)
0.000	0.000	8.612	16.525	14.753
0.100	0.100	8.511	16.353	14.707
0.200	0.200	8.417	16.183	14.661
0.300	0.300	8.331	16.014	14.614
0.400	0.400	8.252	15.848	14.568
0.500	0.500	8.178	15.683	14.522
0.600	0.600	8.111	15.520	14.477
0.700	0.700	8.050	15.358	14.431
0.800	0.800	7.993	15.199	14.385
0.900	0.900	7.942	15.040	14.340
1.000	1.000	7.895	14.884	14.295
1.100	1.100	7.853	14.729	14.250
1.200	1.200	7.814	14.576	14.205
1.300	1.300	7.780	14.424	14.160
1.400	1.400	7.749	14.274	14.116
1.500	1.500	7.722	14.126	14.071
1.600	1.600	7.698	13.979	14.027
1.700	1.700	7.676	13.834	13.982
1.800	1.800	7.658	13.690	13.938
1.900	1.900	7.642	13.547	13.894
2.000	2.000	7.629	13.406	13.851
2.100	2.100	7.618	13.267	13.807
2.200	2.200	7.609	13.129	13.763
2.300	2.300	7.602	12.992	13.720
2.400	2.400	7.597	12.857	13.677
2.500	2.500	7.594	12.724	13.634
2.600	2.600	7.593	12.591	13.591
2.700	2.700	7.593	12.460	13.548
2.800	2.800	7.594	12.331	13.505
2.900	2.900	7.597	12.202	13.462
3.000	3.000	7.601	12.075	13.420
3.100	3.100	7.607	11.950	13.378
3.200	3.200	7.613	11.825	13.335
3.300	3.300	7.621	11.703	13.293
3.400	3.400	7.629	11.581	13.252
3.500	3.500	7.638	11.460	13.210
3.600	3.600	7.648	11.341	13.168
3.700	3.700	7.659	11.223	13.127
3.800	3.800	7.671	11.106	13.085
3.900	3.900	7.683	10.991	13.044
4.000	4.000	7.696	10.877	13.003
4.100	4.100	7.709	10.764	12.962
4.200	4.200	7.723	10.651	12.921
4.300	4.300	7.737	10.541	12.880
4.400	4.400	7.752	10.431	12.840
4.500	4.500	7.767	10.323	12.799
4.600	4.600	7.783	10.215	12.759
4.700	4.700	7.799	10.109	12.719
4.800	4.800	7.815	10.004	12.678
4.900	4.900	7.831	9.900	12.638
5.000	5.000	7.848	9.797	12.599
5.100	5.100	7.865	9.695	12.559
5.200	5.200	7.882	9.594	12.519
5.300	5.300	7.899	9.494	12.480

5.400	5.400	7.917	9.395	12.440
5.500	5.500	7.934	9.298	12.401
5.600	5.600	7.952	9.201	12.362
5.700	5.700	7.970	9.105	12.323
5.800	5.800	7.987	9.010	12.284
5.900	5.900	8.005	8.917	12.245
6.000	6.000	8.023	8.824	12.207
6.100	6.100	8.041	8.732	12.168
6.200	6.200	8.059	8.641	12.130
6.300	6.300	8.077	8.552	12.092
6.400	6.400	8.095	8.462	12.054
6.500	6.500	8.113	8.375	12.016
6.600	6.600	8.131	8.287	11.978
6.700	6.700	8.149	8.201	11.940
6.800	6.800	8.167	8.116	11.902
6.900	6.900	8.185	8.031	11.865
7.000	7.000	8.203	7.948	11.828
7.100	7.100	8.221	7.865	11.790
7.200	7.200	8.238	7.784	11.753
7.300	7.300	8.256	7.702	11.716
7.400	7.400	8.274	7.622	11.679
7.500	7.500	8.291	7.543	11.642
7.600	7.600	8.309	7.465	11.606
7.700	7.700	8.326	7.387	11.569
7.800	7.800	8.344	7.310	11.532
7.900	7.900	8.361	7.234	11.496
8.000	8.000	8.378	7.159	11.460
8.100	8.100	8.395	7.084	11.424
8.200	8.200	8.412	7.011	11.388
8.300	8.300	8.429	6.938	11.352
8.400	8.400	8.445	6.866	11.316
8.500	8.500	8.462	6.794	11.280
8.600	8.600	8.478	6.724	11.245
8.700	8.700	8.495	6.654	11.209
8.800	8.800	8.511	6.584	11.174
8.900	8.900	8.527	6.516	11.139
9.000	9.000	8.543	6.448	11.104
9.100	9.100	8.559	6.381	11.069
9.200	9.200	8.575	6.315	11.034
9.300	9.300	8.590	6.249	10.999
9.400	9.400	8.606	6.184	10.964
9.500	9.500	8.622	6.120	10.930
9.530	9.530	8.626	6.101	10.919

FOR THE DISCHARGE AT THE END OF SEGMENT 1
DISCHARGER = LAWRENCEVILLE STP (VA0020354)
FLOW = .6 MGD cBOD5 = 25 Mg/L TKN = 20 Mg/L D.O. = 6.5 Mg/L

FLOW FROM INCREMENTAL DRAINAGE AREA = 4.1026 MGD

********** RESPONSE FOR SEGMENT 2 **********

TOTAL STREAMFLOW = 5.2015 MGD
(Including Discharge, Tributaries and Incremental D.A. Flow)

DISTANCE FROM HEAD OF SEGMENT (MI.)	TOTAL DISTANCE FROM MODEL BEGINNING (MI.)	DISSOLVED OXYGEN (Mg/L)	cBODu (Mg/L)	nBODu (Mg/L)
0.000	9.530	9.084	11.738	9.538
0.100	9.630	9.093	11.694	9.528
0.200	9.730	9.102	11.650	9.518
0.300	9.830	9.111	11.606	9.508

FOR THE TRIBUTARY AT THE END OF SEGMENT 2
FLOW = 7.51 MGD cBOD5 = 2 Mg/L TKN = 0 Mg/L D.O. = 9.539 Mg/L

FLOW FROM INCREMENTAL DRAINAGE AREA = 0.0115 MGD

********** RESPONSE FOR SEGMENT 3 **********

TOTAL STREAMFLOW = 12.7230 MGD
(Including Discharge, Tributaries and Incremental D.A. Flow)

DISTANCE FROM HEAD OF SEGMENT (MI.)	TOTAL DISTANCE FROM MODEL BEGINNING (MI.)	DISSOLVED OXYGEN (Mg/L)	cBODu (Mg/L)	nBODu (Mg/L)
0.000	9.830	9.364	7.701	3.887
0.100	9.930	9.332	7.654	3.880
0.200	10.030	9.300	7.608	3.873
0.300	10.130	9.270	7.561	3.866
0.400	10.230	9.240	7.516	3.859
0.500	10.330	9.211	7.470	3.852
0.600	10.430	9.183	7.424	3.845
0.700	10.530	9.156	7.379	3.838
0.800	10.630	9.129	7.334	3.832
0.900	10.730	9.104	7.290	3.825
1.000	10.830	9.078	7.246	3.818
1.100	10.930	9.054	7.202	3.811
1.200	11.030	9.030	7.158	3.804
1.300	11.130	9.007	7.114	3.797
1.400	11.230	8.985	7.071	3.790
1.500	11.330	8.963	7.028	3.783
1.600	11.430	8.942	6.985	3.777
1.700	11.530	8.922	6.943	3.770
1.800	11.630	8.902	6.901	3.763
1.900	11.730	8.883	6.859	3.756
2.000	11.830	8.864	6.817	3.749
2.100	11.930	8.846	6.776	3.743
2.200	12.030	8.829	6.735	3.736
2.300	12.130	8.812	6.694	3.729
2.400	12.230	8.796	6.653	3.722
2.500	12.330	8.780	6.613	3.716
2.600	12.430	8.765	6.572	3.709
2.700	12.530	8.750	6.532	3.702
2.800	12.630	8.736	6.493	3.696
2.900	12.730	8.722	6.453	3.689
3.000	12.830	8.708	6.414	3.682
3.100	12.930	8.696	6.375	3.676
3.200	13.030	8.683	6.336	3.669
3.300	13.130	8.671	6.298	3.662
3.400	13.230	8.660	6.260	3.656
3.500	13.330	8.649	6.222	3.649
3.600	13.430	8.638	6.184	3.643
3.700	13.530	8.628	6.146	3.636
3.800	13.630	8.619	6.109	3.629
3.900	13.730	8.609	6.072	3.623
4.000	13.830	8.600	6.035	3.616
4.100	13.930	8.592	5.998	3.610
4.200	14.030	8.584	5.962	3.603
4.300	14.130	8.576	5.926	3.597
4.400	14.230	8.568	5.890	3.590
4.500	14.330	8.561	5.854	3.584
4.600	14.430	8.555	5.818	3.577

FOR THE TRIBUTARY AT THE END OF SEGMENT 3
FLOW = .78.6 MGD cBOD5 = 2 Mg/L TKN = 0 Mg/L D.O. = 9.5432 Mg/L

FLOW FROM INCREMENTAL DRAINAGE AREA = 1.8797 MGD

********** RESPONSE FOR SEGMENT 4 **********

TOTAL STREAMFLOW = 93.2028 MGD
(Including Discharge, Tributaries and Incremental D.A. Flow)

DISTANCE FROM HEAD OF SEGMENT (MI.)	TOTAL DISTANCE FROM MODEL BEGINNING (MI.)	DISSOLVED OXYGEN (Mg/L)	cBODu (Mg/L)	nBODu (Mg/L)
0.000	14.430	9.408	5.112	0.488
0.100	14.530	9.392	5.090	0.488
0.200	14.630	9.375	5.069	0.487
0.300	14.730	9.359	5.048	0.486
0.400	14.830	9.342	5.026	0.486
0.500	14.930	9.326	5.005	0.485
0.600	15.030	9.311	5.000	0.485
0.700	15.130	9.316	5.000	0.484
0.800	15.230	9.321	5.000	0.484
0.900	15.330	9.326	5.000	0.483
1.000	15.430	9.331	5.000	0.482
1.100	15.530	9.336	5.000	0.482
1.200	15.630	9.342	5.000	0.481
1.300	15.730	9.347	5.000	0.481
1.400	15.830	9.352	5.000	0.480
1.500	15.930	9.357	5.000	0.479
1.600	16.030	9.362	5.000	0.479
1.700	16.130	9.367	5.000	0.478
1.800	16.230	9.372	5.000	0.477
1.900	16.330	9.377	5.000	0.477
2.000	16.430	9.382	5.000	0.476
2.100	16.530	9.387	5.000	0.476
2.200	16.630	9.391	5.000	0.475
2.300	16.730	9.396	5.000	0.475
2.400	16.830	9.401	5.000	0.474
2.500	16.930	9.406	5.000	0.473
2.600	17.030	9.411	5.000	0.473
2.700	17.130	9.415	5.000	0.472
2.800	17.230	9.420	5.000	0.472
2.900	17.330	9.425	5.000	0.471
3.000	17.430	9.430	5.000	0.470
3.100	17.530	9.434	5.000	0.470
3.200	17.630	9.439	5.000	0.469
3.300	17.730	9.444	5.000	0.468
3.400	17.830	9.448	5.000	0.468
3.500	17.930	9.453	5.000	0.467
3.600	18.030	9.458	5.000	0.467
3.700	18.130	9.462	5.000	0.466
3.800	18.230	9.467	5.000	0.465
3.900	18.330	9.471	5.000	0.465
4.000	18.430	9.476	5.000	0.464
4.100	18.530	9.480	5.000	0.464
4.200	18.630	9.485	5.000	0.463
4.300	18.730	9.489	5.000	0.463
4.400	18.830	9.494	5.000	0.462
4.500	18.930	9.498	5.000	0.461
4.600	19.030	9.502	5.000	0.461
4.700	19.130	9.507	5.000	0.460

BASELINE SAG

ALLOWABLE D.O. IN MEHERRIN WITHOUT VIOLATING ANTIDEGRADATION:

D.O. = 9.111 mg/L

4.800	19.230	9.511	5.000	0.460
4.900	19.330	9.516	5.000	0.459
5.000	19.430	9.520	5.000	0.458

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DATA FILE = BASEHIGH.MOD

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REGIONAL MODELING SYSTEM VERSION 3.2

DATA FILE SUMMARY

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THE NAME OF THE DATA FILE IS: BASEHIGH.MOD

THE STREAM NAME IS: ROSES CREEK-> GREAT CREEK-> MEHERRIN RIVER
THE RIVER BASIN IS: CHOWAN
THE SECTION NUMBER IS: 3
THE CLASSIFICATION IS: III

STANDARDS VIOLATED (Y/N) = N
STANDARDS APPROPRIATE (Y/N) = Y

DISCHARGE WITHIN 3 MILES (Y/N) = N

THE DISCHARGE BEING MODELED IS: ALBERTA STP (VA0026816)

PROPOSED LIMITS ARE:
FLOW = .1 MGD
BOD5 = 25 MG/L
TKN = 20 MG/L
D.O. = 5 MG/L

THE NUMBER OF SEGMENTS TO BE MODELED = 4

7Q10 WILL BE CALCULATED BY: DRAINAGE AREA COMPARISON
THE GAUGE NAME IS: VDEQ #02015600
GAUGE DRAINAGE AREA = 30.7 SQ.MI.
GAUGE 7Q10 = 5.04 MGD
DRAINAGE AREA AT DISCHARGE = 2.43 SQ.MI.

STREAM A DRY DITCH AT DISCHARGE (Y/N) = N
ANTIDEGRADATION APPLIES (Y/N) = N

ALLOCATION DESIGN TEMPERATURE = 12.4 °C

SEGMENT INFORMATION

####### SEGMENT # 1 #######

SEGMENT ENDS BECAUSE: A DISCHARGE ENTERS AT END

SEGMENT LENGTH = 9.53 MI

SEGMENT WIDTH = 2 FT
SEGMENT DEPTH = .3 FT
SEGMENT VELOCITY = 1 FT/SEC

DRAINAGE AREA AT SEGMENT START = 2.43 SQ.MI.
DRAINAGE AREA AT SEGMENT END = 27.42 SQ.MI.

ELEVATION AT UPSTREAM END = 289.5 FT
ELEVATION AT DOWNSTREAM END = 162.3 FT

THE CROSS SECTION IS: RECTANGULAR
THE CHANNEL IS: MODERATELY MEANDERING

POOLS AND RIFFLES (Y/N) = N

THE BOTTOM TYPE = SAND
SLUDGE DEPOSITS = NONE
AQUATIC PLANTS = NONE
ALGAE OBSERVED = NONE
WATER COLORED GREEN (Y/N) = N

THE DISCHARGE AT THE SEGMENT END IS: LAWRENCEVILLE STP (VA0020354)

ITS CONCENTRATIONS ARE:
FLOW = .6 MGD
BOD5 = 25 MG/L
TKN = 20 MG/L
D.O. = 6.5 MG/L

SEGMENT INFORMATION

####### SEGMENT # 2 #######

SEGMENT ENDS BECAUSE: A TRIBUTARY ENTERS AT END

SEGMENT LENGTH = .3 MI

SEGMENT WIDTH = 9.5 FT
SEGMENT DEPTH = 1 FT
SEGMENT VELOCITY = .75 FT/SEC

DRAINAGE AREA AT SEGMENT START = 27.42 SQ.MI.
DRAINAGE AREA AT SEGMENT END = 27.49 SQ.MI.

ELEVATION AT UPSTREAM END = 162.3 FT
ELEVATION AT DOWNSTREAM END = 159 FT

THE CROSS SECTION IS: RECTANGULAR
THE CHANNEL IS: MODERATELY MEANDERING

POOLS AND RIFFLES (Y/N) = N

THE BOTTOM TYPE = SAND
SLUDGE DEPOSITS = NONE
AQUATIC PLANTS = NONE
ALGAE OBSERVED = NONE
WATER COLORED GREEN (Y/N) = N

TRIBUTARY DATA
FLOW = 7.51 MGD
BOD5 = 2 MG/L
TKN = 0 MG/L
D.O. = 9.539 MG/L

SEGMENT INFORMATION

####### SEGMENT # 3 #######

SEGMENT ENDS BECAUSE: A TRIBUTARY ENTERS AT END

SEGMENT LENGTH = 4.6 MI

SEGMENT WIDTH = 9.5 FT
SEGMENT DEPTH = 1.5 FT
SEGMENT VELOCITY = 1 FT/SEC

DRAINAGE AREA AT SEGMENT START = 45.74 SQ.MI.
DRAINAGE AREA AT SEGMENT END = 57.19 SQ.MI.

ELEVATION AT UPSTREAM END = 159 FT
ELEVATION AT DOWNSTREAM END = 137 FT

THE CROSS SECTION IS: RECTANGULAR
THE CHANNEL IS: MODERATELY MEANDERING

POOLS AND RIFFLES (Y/N) = N

THE BOTTOM TYPE = SAND
SLUDGE DEPOSITS = NONE
AQUATIC PLANTS = NONE
ALGAE OBSERVED = NONE
WATER COLORED GREEN (Y/N) = N

TRIBUTARY DATA
FLOW = 78.6 MGD
BOD5 = 2 MG/L
TKN = 0 MG/L
D.O. = 9.5432 MG/L

SEGMENT INFORMATION

####### SEGMENT # 4 #######

SEGMENT ENDS BECAUSE: THE MODEL ENDS

SEGMENT LENGTH = 5 MI

SEGMENT WIDTH = 30 FT
SEGMENT DEPTH = 2.7 FT
SEGMENT VELOCITY = 1.5 FT/SEC

DRAINAGE AREA AT SEGMENT START = 653.3 SQ.MI.
DRAINAGE AREA AT SEGMENT END = 740.15 SQ.MI.

ELEVATION AT UPSTREAM END = 137 FT
ELEVATION AT DOWNSTREAM END = 128 FT

THE CROSS SECTION IS: RECTANGULAR
THE CHANNEL IS: MOSTLY STRAIGHT

POOLS AND RIFFLES (Y/N) = N

THE BOTTOM TYPE = SAND
SLUDGE DEPOSITS = NONE
AQUATIC PLANTS = NONE
ALGAE OBSERVED = NONE
WATER COLORED GREEN (Y/N) = N

****

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04-04-1996 16:31:20

Attachment E

Facility Inspection Report

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Wastewater Facility Inspection Report

Facility Name:	Lawrenceville WWTP	**Facility No.:**	VA0020354
City/County:	Brunswick County	**Inspection Agency:**	DEQ
Inspection Date:	January 5, 2011	**Date Form Completed:**	January 19, 2011
Inspector:	Charles Stitzer	**Time Spent:**	18 hrs. w/ travel & report
Reviewed By:		**Unannounced Insp.?**	No
		FY-Scheduled Insp.?	Yes

Present at Inspection: Robert Williams, Robert Archer

TYPE OF FACILITY:

Domestic		Industrial	
[ ] Federal	[x] Major	[ ] Major	[ ] Primary
[x] Non-Federal	[ ] Minor	[ ] Minor	[ ] Secondary

Population Served: approx.: 5000

Number of Connections: approx.: 1050

TYPE OF INSPECTION:

[x] Routine — Date of last inspection: September 8, 2009

[ ] Compliance — Agency: DEQ/PRO

[ ] Reinspection

EFFLUENT MONITORING, Effluent Date: January 5, 2011

CBOD: * mg/L TSS: 2.4 mg/L Flow: 0.681 MGD

Other: pH 7.01 SU, FC 1, DO 9.36 mg/L

* CBOD, NH_3 - N, TKN analyzed by B&B Laboratory. Data for 1/5/11 not available at time of inspection.

CHANGES AND/OR CONSTRUCTION

DATA VERIFIED IN PREFACE	[ ] Updated	[x] No changes
Has there been any new construction?	[ ] Yes*	[x] No
If yes, were plans and specifications approved?	[ ] Yes	[ ] No* [x] N/A
DEQ approval date:	N/A	

(A) PLANT OPERATION AND MAINTENANCE

1. Class and number of licensed operators: Class I – 0, Class II - 2 Class III - 1, Class IV – 2, OIT – 1

2. Hours per day plant is staffed: 12 hours/day (6 a.m. – 6 p.m.), 7 days/week

3.	Describe adequacy of staffing:	[X] Good	[ ] Average	[ ] Poor*
4.	Does the plant have an established program for training personnel?	[x] Yes	[ ] No	
5.	Describe the adequacy of the training program:	[ ] Good	[x] Average	[ ] Poor*
6.	Are preventive maintenance tasks scheduled?	[x] Yes	[ ] No*	
7.	Describe the adequacy of maintenance:	[x] Good	[ ] Average	[ ] Poor*
8.	Does the plant experience any organic/hydraulic overloading?	[x] Yes*	[ ] No	

If yes, identify cause and impact on plant: The WWTP experiences very little ACUTE impacts related to high I&I . However, excessive I&I presents a challenge to the operators because of variable and dilute influent. An I&I reduction program is ongoing.

9.	Any bypassing since last inspection?	[X] Yes*	[ ] No	
10.	Is the on-site electric generator operational?	[x] Yes	[ ] No*	[ ] N/A
11.	Is the STP alarm system operational?	[x] Yes	[ ] No *	[ ] N/A
12.	How often is the standby generator exercised?	[x] Weekly	[ ] Monthly	[ ] Other:
	Power Transfer Switch?	[x] Weekly	[ ] Monthly	[ ] Other:
	Alarm System?	[ ] Weekly	[ ] Monthly	[x]Other: Daily

13. When were the cross connection control devices last tested on the potable water service? 10/22/09*

14.	Is sludge disposed in accordance with the approved sludge disposal plan?	[x] Yes	[ ] No*	[ ] N/A
15.	Is septage received by the facility?	[ ] Yes	[x] No	
	Is septage loading controlled?	[ ] Yes	[ ] No *	[x] N/A
	Are records maintained?	[ ] Yes	[ ] No*	[x] N/A
16.	Overall appearance of facility:	[x] Good	[ ] Average	[ ] Poor*

Comments: #3 The current level of staffing is adequate to avoid most scheduling problems during holidays, sicknesses, or unplanned plant maintenance. #4 Training includes OJT, Short School, DEQ Lab Workshops, and an incentive program for operator license upgrade. #11 Alarm signals report to operator's control/enunciator panel and local audio and visual alarm signals. #13 RPZ certification has expired. The RPZ must be certified asap and annually thereafter.

(C) SAMPLING

1.	Are sampling locations capable of providing representative samples?	[x] Yes	[ ] No*	[ ] N/A
2.	Do sample types correspond to those required by the permit?	[x] Yes	[ ] No*	[ ] N/A
3.	Do sampling frequencies correspond to those required by the permit?	[x] Yes	[ ] No*	[ ] N/A
4.	Are composite samples collected in proportion to flow?	[x] Yes	[ ] No*	[ ] N/A
5.	Are composite samples refrigerated during collection?	[x] Yes	[ ] No*	[ ] N/A
6.	Does plant maintain required records of sampling?	[x] Yes	[ ] No*	[ ] N/A
7.	Does plant run operational control tests?	[x] Yes	[ ] No*	[ ] N/A

Comments: The plant performs pH, D.O., TSS, E. Coli, MLSS, MLVSS, and settleability on mixed liquor.

(D) TESTING

1. Who performs the testing?
   - [x] Plant/ Lab: pH, D.O., TSS, E. Coli
   - [ ] Central Lab
   - [x] Commercial Lab - Name: B & B Lab. and Consultants $CBOD_5$, TKN, NH_3-N

If plant performs any testing, complete 2-4.

2. What method is used for chlorine analysis? No Cl2 testing - UV disinfection
3. Is sufficient equipment available to perform required tests? [ ] Yes [ ] No* [x] N/A
4. Does testing equipment appear to be clean and/or operable? [ ] Yes [ ] No* [x] N/A

Comments: Please see enclosed DEQ *Laboratory Inspection Report*.

(E) FOR INDUSTRIAL FACILITIES W/ TECHNOLOGY BASED LIMITS N/A

1. Is the production process as described in the permit application? (If no, describe changes in comments)

   [ ] Yes [ ] No* [x] N/A

2. Do products and production rates correspond to the permit application? (If no, list differences in comments section)

   [ ] Yes [ ] No* [x] N/A

3. Has the State been notified of the changes and their impact on plant effluent?

   [ ] Yes [ ] No* [x] N/A

Comments: None

FOLLOW UP TO COMPLIANCE RECOMMENDATIONS FROM THE SEPTEMBER 8, 2009 DEQ INSPECTION:

Have RPZ recertified ASAP and annually thereafter. RPZ was certified shortly after last inspection (10/22/09) but has again expired.

FOLLOW UP TO GENERAL RECOMMENDATIONS FROM THE SEPTEMBER 8, 2009 DEQ INSPECTION:

Add RPZ re-certification and lab equipment thermister and thermometer checks to computer generated maintenance tasks to provide a reminder that these annual tasks are due. ***This has not yet been done, however, a computer generated maintenance system is currently under evaluation by the WWTP.***

Maintain greater inventory of belt filter press spare parts to reduce down time. ***This has not been done, however, other steps have been taken by the WWTP staff to reduce filter press down time (such as working with a local metal fabricator to make spare parts faster than can be provided by the belt presses' manufacturer).***

INSPECTION REPORT SUMMARY

Compliance Recommendations/Request for Corrective Action:

Have RPZ recertified ASAP and annually thereafter.

General Recommendations/Observations:

Add RPZ re-certification and lab equipment thermister and thermometer checks to computer generated maintenance tasks to provide a reminder that these annual tasks are due.

Breakdown of the sludge filter press has become somewhat problematic. However, WWTP staff have developed a relationship with a good local machine shop that has been able to manufacture new parts in a short time frame. The ability to have the needed parts made locally has kept filter-press downtime to a minimum. Also, the internal purchase requisition system which had caused replacement delays in the past has become more responsive. Administrative delays have not been a problem since last inspection..

The WWTP lab has achieved full VELAP certification. This is a significant achievement.

Comments:

The WWTP sludge filter press was again out-of-service. However, there was room for storage of additional solids in the system before the quality of the effluent would be negatively impacted. Replacement parts had been ordered from a local machine shop. A couple of days post inspection the Chief Operator reported that the needed parts had been manufactured and installed. One of the 2 belt filter presses had been returned to service. Since the belt filter presses have proven to contain high wear parts that result in frequent downtime, WWTP staff have adapted to be able to effect routine repairs quickly.

UNIT PROCESS: Sewage Pumping

The following satellite pump stations are maintained: Mayfield, Green Acres, Pine Crest, Brookscroft and WTP Pump Stations.

All stations are equipped with two pumps that are operated in lead/lag mode. All stations are equipped with local audio and visual alarm signals. Pine Crest and Green Acres pump stations are equipped with auto-dial systems. Alarm systems are tested weekly and the stations are checked daily.

The WTP (water treatment plant) pump station, which receives no domestic wastewater, has one-day storage capacity available. The Mayfield and Jr. High Pump Stations are equipped with portable pump quick connections. The Pine Crest Pump Station has an onsite backup generator.

A new pump station is proposed to be added to the system at the Regional Jail in 2011-2012

UNIT PROCESS: Sewage Pumping

1. Name of station: Influent Lift Station
2. Location (if not at STP): N/A
3. Following equipment operable:
   a. All pumps? [x] Yes [ ] No*
   b. Ventilation? [x] Yes [ ] No* [ ] N/A
   c. Control system? [x] Yes [ ] No* [ ] N/A
   d. Sump pump? [ ] Yes [ ] No* [x] N/A
   e. Seal water system? [ ] Yes [ ] No* [x] N/A

4. Reliability considerations:
   a. Class [ ] I [x] II [ ] III
   b. Alarm system operable? [x] Yes [ ] No [ ] N/A
   c. Alarm conditions monitored:
      1. high water level: [x] Yes [ ] No* [ ] N/A
      2. high liquid level in dry well: [ ] Yes [ ] No* [x] N/A
      3. main electric power: [x] Yes [ ] No* [ ] N/A
      4. auxiliary electric power: [ ] Yes [ ] No* [x] N/A
      5. failure of pump motors to start: [x] Yes [ ] No* [ ] N/A
      6. test function: [x] Yes [ ] No*
      7. other: low level
   d. Backup for alarm system operational? [ ] Yes [ ] No* [x] N/A
   e. Alarm signal reported to (identify): local audible & visual, and control panel & auto-dial
   f. Continuous operability provisions:
      1. Generator hook up? [x] Yes [ ] No
      2. Two sources of electricity? [ ] Yes [x] No (on-site generator)
      3. Portable pump? [ ] Yes [x] No
      4. 1 day storage? [ ] Yes [x] No
      5. other: N/A

5. Does station have bypass? [ ] Yes* [x] No
   a. Evidence of bypass use? [ ] Yes* [ ] No [x] N/A
   b. Can bypass be disinfected? [ ] Yes [ ] No* [x] N/A
   c. Can bypass be measured? [ ] Yes [ ] No* [x] N/A

6. How often is station checked? daily

7. General condition: [x] Good [ ] Fair [ ] Poor*

Comments: The lift station is equipped with three pumps set in lead/lag mode that rotate in operation. Emergency generator is tested monthly.

UNIT PROCESS: Flow Measurement

[x] Influent [ ] Intermediate [ ] Effluent

1. Type measuring device: 18" Parshall Flume, stilling well, and ultrasonic sensor w/chart recorder, totalizer and instantaneous (LCD) display
2. Present reading: Instantaneous – 1060 gpm @ 1421 hrs on 01/05/11
3. Bypass channel? [ ] Yes [x] No
   Metered? [ ] Yes [ ] No* [x] N/A
4. Return flows discharged upstream from meter? [x] Yes [ ] No
   If Yes, identify: Underflow from drying beds, filtrate from Belt Presses, Gravity Thickener discharge and digester supernatant
5. Device operating properly? [x] Yes [ ] No*
6. Date of last calibration: 08/12/10
7. Evidence of following problems:
   a. Obstructions? [ ] Yes* [x] No
   b. Grease? [ ] Yes* [x] No
8. General condition: [x] Good [ ] Fair [ ] Poor*

Comments: Weekly maintenance is performed to keep the stilling well clear. A splitter box, immediately following influent flow measurement, splits flow to the two Oxidation Ditches (PLC).

UNIT PROCESS: Screening/Comminution

1.	Number of units:	Manual: 1(bypass)		Mechanical: 1
	Number of units in operation:	Manual: 0		Mechanical: 1
2.	Bypass channel provided?	[x] Yes	[ ] No	
	Bypass channel in use?	[ ] Yes	[x] No	[ ] N/A
3.	Area adequately ventilated?	[x] Yes	[ ] No*	
4.	Alarm system for equipment failure or overloads?	[x] Yes	[ ] No	[ ] N/A
	If present, is the alarm system operational?	[x] Yes	[ ] No *	[ ] N/A
5.	Proper flow-distribution between units?	[ ] Yes	[ ] No *	[x] N/A
6.	How often are units checked and cleaned?	daily		
7.	Cycle of operation:	float and timer activated		
8.	Volume of screenings removed:	~ 1 yd^3/week		
9.	General condition:	[x] Good	[ ] Fair	[ ] Poor*

Comments: #4 Alarms for mechanical failure and high-liquid level. Screenings unit includes a de-watering screw press and hopper.

UNIT PROCESS: Grit Removal

1.	Number of units:	2 (one mechanical, one manual for bypass)		
	Number of units in operation:	1 (mechanical – cyclone)		
2.	Unit adequately ventilated?	[x] Yes	[ ] No *	
3.	Operation of grit collection equipment:	[ ] Manual	[x] Time clock	[ ] Continuous duty
4.	Proper flow-distribution between units?	[ ] Yes	[ ] No *	[x] N/A
5.	Daily volume of grit removed:	~ 10 gallons/week		
6.	All equipment operable?	[x] Yes	[ ] No *	
7.	General condition:	[x] Good	[ ] Fair	[ ] Poor*

Comments: Cyclone grit collector is equipped with a de-watering screw and hopper.

UNIT PROCESS: Activated Sludge Aeration

1. Number of units: 2 (Kruger Isolation Ditches)
   Number of units in operation: 2

2. Mode of operation: sequential batch treatment

3. Proper flow distribution between units? [x] Yes [ ] No* [ ] N/A

4. Foam control operational? [x] Yes [ ] No* [ ] N/A

5. Scum control operational? [x] Yes [ ] No* [ ] N/A

6. Evidence of the following problems:
   a. Dead spots? [ ] Yes* [x] No
   b. Excessive foam? [ ] Yes* [x] No
   c. Poor aeration? [ ] Yes* [x] No
   d. Excessive aeration? [ ] Yes* [x] No
   e. Excessive scum? [ ] Yes* [x] No
   f. Aeration equipment malfunction? [ ] Yes* [x] No
   g. Other:

7. Mixed liquor characteristics (as available) ***average or range for 01/05/11 Oxidation ditch 1 & 2***

pH:	6.66/6.97 SU	MLSS:	5040/4960 mg/L
DO:	4.01/4.69 mg/L	SDI:	N/A
SVI:	178.6/175	Color:	Brown - normal
Odor:	earthy	Settleability:	900/870 ml/L in 30 minutes
		Other:	MLVSS: 3500/3490 mg/L

8. Return/waste sludge:
   a. return rate: N/A - sludge not wasted is RAS; O-ditch operated in 5 hr. cycles
   b. waste rate: Based on visual observations, ~0.50- 0.60 MGD
   c. frequency of wasting: daily (high MLSS and Settleability is result of off-line belt filter press. Solids are abnormally high in the system.

9. Aeration system control:
   [ ] Time Clock [ ] Manual [ ] Continuous
   [x] Other oxygen sensors tied to PLC

10. Effluent control devices working properly? [x] Yes [ ] No [ ] N/A

11. General condition: [x] Good [ ] Fair [ ] Poor *

Comments: #7 Mixed liquor was dark and had a high solids content . #8 Gravity Thickener and Aerobic Digester had abnormally high solids content due to a breakdown of the belt filter press. Press was returned to service two days post inspection and excessive solids were being removed from system. #10 PLC controlled effluent weirs. Liquid level monitored by ultra-sonic sensors. Aeration (PLC to the digester with dissolved oxygen sensors) provided by submerged rotors. Scum control boxes are manually dumped to the digester as needed.

UNIT PROCESS: Sludge Pumping

(Oxidation Ditches to Gravity Thickener)

1. Number of Pumps: 2 (one submersible pump in each ditch)
   Number of pumps in operation: 1

2. Type of sludge pumped: [ ] Primary [ ] Secondary [ ] Return Activated
   [ ] Combination [x] Other: WAS

3. Type of pump: [ ] Plunger [ ] Diaphragm [ ] Screwlift
   [x] Centrifugal[ ] Progressing cavity [ ] Other:

4. Mode of operation: [x] Manual [ ] Automatic [ ] Other:

5. Sludge volume pumped: ~30,000 gal pumped from ditch to digestor on 1/5/11 (slightly less than normal due to broken belt filter press and resulting excessive accumulated solids in system.)

6. Alarm system for equipment failures or overloads operational? [x] Yes [ ] No* [ ] N/A

7. General condition: [x] Good [ ] Fair [ ] Poor*

Comments: Alarms include high liquid level and failure of pumps to start. #5 The need for sludge pumping is determined by visual examination and the experience of the operators.

UNIT PROCESS: Sludge Pumping

(Gravity Thickener to Aerobic Digester)

1. Number of Pumps: 3 (formerly the Trickling Filter Recirculation Pump Station)
   Number of pumps in operation: 1

2. Type of sludge pumped: [ ] Primary [ ] Secondary [ ] Return Activated
   [ ] Combination [x] Other: thickened WAS

3. Type of pump: [ ] Plunger [ ] Diaphragm [ ] Screwlift
   [x] Centrifugal[ ] Progressing cavity [ ] Other:

4. Mode of operation: [ ] Manual [x] Automatic [ ] Other:

5. Sludge volume pumped: ~2611 gal on 01/04/11

6. Alarm system for equipment failures or overloads operational? [ ] Yes [ ] No* [x] N/A

7. General condition: [x] Good [ ] Fair [ ] Poor*

Comments:

UNIT PROCESS: Gravity Thickening

1.	Number of units:	1		
	Number of units in operation:	1		
2.	Types of sludge(s) fed to the thickener:	[ ] Primary	[x] WAS	[ ] Combination
		[ ] Other:		
3.	Solids concentration in the influent sludge:	Usually 2-3 % (estimated based on sludge level in thickener)		
	Solids concentration in thickened sludge:	Usually 2-3 % (estimated based on sludge level in thickener)		
4.	Sludge feeding:	[ ] Continuous		[x] Intermittent
5.	Signs of short-circuiting and/or overloads?	[ ] Yes*	[x] No	[ ] N/A
6.	Effluent weirs level?	[x] Yes	[ ] No *	[ ] N/A
7.	Sludge collection system work properly?	[x] Yes	[ ] No *	[ ] N/A
8.	Influent, effluent baffle systems work properly?	[x] Yes	[ ] No *	[ ] N/A
9.	Chemical addition?	[ ] Yes	[x] No *	[ ] N/A
	Identify chemical/dose:	N/A		
10.	General condition:	[x] Good	[ ] Fair	[ ] Poor*

Comments: One of the former primary clarifiers was converted to a Gravity Thickener. The second former clarifier is currently not used. Gravity Thickener receives WAS from the Oxidation Ditches. Sludge is pumped from the thickener to the Primary Digester. The operators try to maintain no more than three feet sludge depth in the Gravity Thickener, although at this inspection, due to worn cone rollers in both belt filter presses and the resulting inability to remove sludge from the Digester for a few days, the sludge level was near the top of the weirs.

UNIT PROCESS: Aerobic Digestion

1. Number of units: 2 (one primary, one secondary in series)

   Number of units in operation: 2

2. Type of sludge treated: [ ] Primary [x] WAS [ ] Other:

3. Frequency of sludge application to digesters: 12/day

4. Supernatant return rate: as needed – unknown

5. pH adjustment provided? [ ] Yes [x] No

   Utilized: [ ] Yes [ ] No [x] N/A

6. Tank contents well-mixed and relatively free of odors? [x] Yes [ ] No*

7. If diffused aeration is used, do diffusers require frequent cleaning? [ ] Yes [ ] No [x] N/A

8. Location of supernatant return: [x] Head [ ] Primary [ ] Other

9. Process control testing: **for 01/05/11**

   a. percent volatile solids: [x] Yes 69.4/70.4 % [ ] No

   b. pH: [x] Yes 6.66/6.97 SU [ ] No

   c. alkalinity: [ ] Yes _____ mg/L [x] No

   d. dissolved oxygen: [x] Yes Not recorded mg/L [ ] No

   e. temp [x] Yes Not recorded ºC [ ] No

10. Foaming problem present? [ ] Yes * [x] No

11. Signs of short-circuiting or overloads?: [ ] Yes * [x] No

12. General condition: [x] Good [ ] Fair [ ] Poor*

Comments: Each digester is equipped with one, two-speed floating mechanical aerator. Sludge flows by gravity from the primary digester to the secondary digester. #9 d, e, DO and temp had not yet been recorded at time of inspection.

UNIT PROCESS: Sludge Pumping

(Digester to Belt Press)

1. Number of Pumps: 2

   Number of pumps in operation: 0

2. Type of sludge pumped: [ ] Primary [ ] Secondary [ ] Return Activated [ ] Combination

   [x] Other: digested sludge

3. Type of pump: [x] Plunger [ ] Diaphragm [ ] Screwlift

   [ ] Centrifugal [ ] Progressing cavity [x] Other: grinder

4. Mode of operation: [x] Manual [ ] Automatic [ ] Other:

5. Sludge volume pumped: As needed to maintain approximately 3 feet of sludge in thickener

6. Alarm system for equipment failures or overloads operational? [ ] Yes [ ] No* [x] N/A

7. General condition: [x] Good [ ] Fair [ ] Poor*

Comments: Digested sludge from the second digester is pumped via a grinder pump in the belt press building. A plunger pump is used to pump the sludge to the flocculation tank where polymer is added and mixed prior to the belt press. At the time of the inspection, the digester contained excessive solids due to broken belt filter press. One of two belt filter presses was repaired and placed on line two days after the inspection and the excessive solids in the system were being reduced.

UNIT PROCESS: Pressure Filtration (Sludge)

(Belt Press)

1. Number of units: 2

   Number In operation: 0

2. Percent solids in influent sludge: 2-3 %

3. Percent solids in discharge cake: 10% on 11/09/10

4. Filter run time: varies

5. Amount cake produced: 5.08 tons on 11/09/10

6. Conditioning chemicals used: [x] Yes [ ] No

   Type and Dose: polymer as needed to condition sludge

7. Sludge pumping: [x] Manual [ ] Automatic

8. Recirculating system included on acid wash: [ ] Yes [ ] No [x] N/A

9. Signs of overloads? [ ] Yes * [x] No

10. General condition: [x] Good [ ] Fair [ ] Poor*

Comments: #1Two cone rollers in different presses failed in late December. The WWTP was able to have a local metal fabrication shop machine replacement parts quicker than could be acquired from the presses' manufacturer. This most recent down time has resulted in accumulation of excess sludge in the system, but far less than when the last major press failure occurred (stator replacement). By necessity, the WWTP staff has developed a repair parts acquisition solution that has reduced filter press down time and retains excellent effluent quality. To avoid similar problems in the future, consider identifying the presses' wear parts and keep an inventory of critical parts that cannot be quickly manufactured locally. Also consider rehabilitating the sludge drying beds for use if filter press repairs cannot be quickly implemented.

UNIT PROCESS: Drying Beds

1. Number of units: 8
   Number of units in operation: 0
   Number of beds with sludge: 0
2. Cover in good condition? [ ] Yes [ ] No [x] N/A
3. Typical sand depth in beds: ~12 inches
4. Typical drying time: N/A
5. Frequency of usage: Out of service for several years
6. Underflow recycle location: Influent pump station
7. Sludge distributed evenly across bed(s)? [ ] Yes [ ] No* [x] N/A
8. Following problems noted: [ ] Yes* [x] No
   a. Odors? [ ] Yes* [x] No
   b. Flies? [ ] Yes* [x] No
   c. Weed growth? [ ] Yes* [x] No
   d. Leakage from bed(s)?
9. If the facility does not have an approved sludge plan, what is the current method of sludge disposal?

   The approved plan calls for landfill disposal.
10. General condition: [x] Good [ ] Fair [ ] Poor*

Comments: Sludge drying beds were to be used as a back up system to the belt filter press. They are currently not in operation and have been allowed to deteriorate from disuse (weeds and debris on filter beds). Rehabilitating and maintaining the sludge drying beds should be considered to insure against problems which could occur during long belt filter press outages.

UNIT PROCESS: Ultraviolet (UV) Disinfection

1.	Number of UV lamps/assemblies: Number in operation:	6 Modules – 40 bulbs/module 4 – 6 (depending on flow)
2.	Type of UV system and design dosage:	vertical UV Modules by Ultratech
3.	Proper flow distribution between units?	[x] Yes [ ] No* [ ] N/A
4.	Method of UV intensity monitoring?	light intensity meter
5.	Adequate ventilation of ballast control boxes?	[x] Yes [ ] No* [ ] N/A
6.	Indication of on/off status of all lamps provided?	[x] Yes [ ] No*
7.	Lamps assemblies easily removed for maintenance?	[x] Yes [ ] No*
8.	Records of lamp operating hours & replacement dates provided:	[x] Yes [ ] No*
9.	Routine cleaning system provide Operated properly? Frequency of routine cleaning:	[x] Yes [ ] No* [x] Yes [ ] No* daily by diffused air; cleaned once/week to ten days with acid/water mix
10.	Lamp energy control system operating properly?	[x] Yes [ ] No*
11.	Date of last system overhaul:	Last total bulb replacement was in 2009
	a. UV unit completely drained	[x] Yes [ ] No*
	b. all surfaces cleaned	[x] Yes [ ] No*
	c. UV transmissibility checked	[x] Yes [ ] No*
	d. output of selected lamps checked	[x] Yes [ ] No*
	e. output of tested lamps	unknown
	f. total operating hours, oldest lamp/assembly	computer program records total hrs.
	g. number of spare lamps and ballasts available:	lamps: ~150 ballasts: ~3
12.	UV protective eyeglasses provided:	[x] Yes [ ] No*
13.	General condition:	[x] Good [ ] Fair [ ] Poor*

Comments: #11 In the past, changing all bulbs at the same time resulted in some e. coli exceedences. It was determined that new bulbs need to "burn in" for a few hundred hours before they reach maximum output. Therefore, the WWTP staff has developed a new staggered replacement regimen to insure that sufficient intensity is maintained. When monitoring indicates a drop in intensity, new bulbs will be added a few at a time. This should insure that the average light intensity remains above the critical level needed for effectiveness.

UNIT PROCESS: Flow Measurement

[ ] Influent [ ] Intermediate [x] Effluent

1.	Type measuring device:	18" Parshall flume and ultrasonic sensor with chart recorder, totalizer and instantaneous display		
2.	Present reading:	529 gpm @ 1437 hours on 01/05/11		
3.	Bypass channel?	[ ] Yes	[x] No	
	Metered?	[ ] Yes	[ ] No*	[x] N/A
4.	Return flows discharged upstream from meter?	[ ] Yes	[x] No	
	If Yes, identify:	N/A		
5.	Device operating properly?	[x] Yes	[ ] No*	
6.	Date of last calibration:	8/12/10		
7.	Evidence of following problems:			
	a. Obstructions?	[ ] Yes*	[x] No	
	b. Grease?	[ ] Yes*	[x] No	
8.	General condition:	[x] Good	[ ] Fair	[ ] Poor*

Comments: An energy dispersion device (baffle) has been installed in the channel immediately above the flume.

UNIT PROCESS: Post Aeration

1.	Number of units:	1			
	Number of units in operation:	1			
2.	Proper flow distribution between units?	[ ] Yes	[ ] No*	[x] N/A	
3.	Evidence of following problems:				
a.	Dead spots?	[ ] Yes*	[x] No		
b.	Excessive foam?	[ ] Yes*	[x] No		
c.	Poor aeration?	[ ] Yes*	[x] No		
d.	Mechanical equipment failure?	[ ] Yes*	[ ] No	[x] N/A	
4.	How is the aerator controlled?	[ ] Time clock	[ ] Manual	[x] Continuous	
		[ ] Other _____		[ ] N/A	
5.	What is the current operating schedule?	continuous – step cascade			
6.	Step weirs level?	[x] Yes	[ ] No*	[ ] N/A	
7.	Effluent D.O. level:	Not checked			
8.	General condition:	[x] Good	[ ] Fair	[ ] Poor*	

Comments:

UNIT PROCESS: Effluent/Plant Outfall

1. Type outfall: [x] Shore based [ ] Submerged

2. Type if shore based: [x] Wingwall [ ] Headwall [ ] Rip Rap [ ] N/A

3. Flapper valve? [ ] Yes [x] No

4. Erosion of bank? [ ] Yes* [x] No [ ] N/A

5. Effluent plume visible? [ ] Yes * [x] No

Comments:

6. Condition of outfall and supporting structures: [x] Good [ ] Fair [ ] Poor *

7. Final effluent, evidence of following problems:

   a. Oil sheen? [ ] Yes* [x] No

   b. Grease? [ ] Yes* [x] No

   c. Sludge bar? [ ] Yes* [x] No

   d. Turbid effluent? [ ] Yes* [x] No

   e. Visible foam? [ ] Yes* [x] No

   f. Unusual odor? [ ] Yes* [x] No

Comments: The final effluent was clear.

cc:

[x] Owner: c/o Mr. C.J. Dean

[x] Operator: Robert Williams

[ ] Local Health Department:

[ ] VDH Engineering Field Office:

[ ] VDH/Central Office - DWE

[x] DEQ - OWCP, attn: Steve Stell

[x] DEQ - Regional Office File

[x] EPA - Region III

Attachment F

Effluent Information

Lawrenceville Wastewater Treatment Plant (VA0020354)
DMR Data Reported November 2007 through February 2012

Flow (MGD)

	Monthly Avg.	Maximum
10-Nov-07	0.76	1.051
10-Dec-07	0.666	0.753
10-Jan-08	0.721	1.202
10-Feb-08	0.77	0.964
10-Mar-08	0.81	1.316
10-Apr-08	0.847	1.309
10-May-08	0.942	2.113
10-Jun-08	0.801	1.15
10-Jul-08	0.681	0.954
10-Aug-08	0.683	0.809
10-Sep-08	0.674	0.88
10-Oct-08	0.753	1.22
10-Nov-08	0.689	0.823
10-Dec-08	0.718	0.898
10-Jan-09	0.864	1.381
10-Feb-09	0.838	1.143
10-Mar-09	0.783	0.925
10-Apr-09	0.982	1.609
10-May-09	0.775	0.98
10-Jun-09	0.808	1.1
10-Jul-09	0.733	1.011
10-Aug-09	0.711	0.967
10-Sep-09	0.719	0.865
10-Oct-09	0.723	0.915
10-Nov-09	0.591	0.685
10-Dec-09	0.941	2.615
10-Jan-10	1.035	1.575
10-Feb-10	0.819	1.353
10-Mar-10	1.042	2.847
10-Apr-10	0.813	2.254
10-May-10	0.722	1.112
10-Jun-10	0.707	1.11
10-Jul-10	0.623	0.76
10-Aug-10	0.593	0.979
10-Sep-10	0.608	0.916
10-Oct-10	0.586	1.153
10-Nov-10	0.669	1.896
10-Dec-10	0.605	0.82
10-Jan-11	0.625	0.8
10-Feb-11	0.641	0.89
10-Mar-11	0.478	0.776
10-Apr-11	0.569	1.419
10-May-11	0.559	1.171
10-Jun-11	0.513	0.893
10-Jul-11	0.452	0.639
10-Aug-11	0.544	1.495
10-Sep-11	0.537	1.547
10-Oct-11	0.534	0.995
10-Nov-11	0.533	0.902
10-Dec-11	0.567	1.178
10-Jan-12	0.568	0.908
10-Feb-12	0.553	0.867
Minimum	0.45	0.64
Maximum	1.04	2.85
Average	0.70	1.17

pH (SU)

	Max.	Min.
10-Nov-07	7.5	7.23
10-Dec-07	7.41	7
10-Jan-08	7.29	7
10-Feb-08	7.24	6.9
10-Mar-08	7.08	6.78
10-Apr-08	7.17	6.74
10-May-08	7.11	6.82
10-Jun-08	7.17	6.79
10-Jul-08	7.27	6.91
10-Aug-08	7.34	6.97
10-Sep-08	7.44	7.02
10-Oct-08	7.26	6.79
10-Nov-08	7.25	6.81
10-Dec-08	7.04	6.78
10-Jan-09	6.94	6.52
10-Feb-09	6.9	6.5
10-Mar-09	6.8	6.4
10-Apr-09	7	6.5
10-May-09	7	6.7
10-Jun-09	7.01	6.75
10-Jul-09	7.05	6.67
10-Aug-09	7.42	6.71
10-Sep-09	7.44	7.01
10-Oct-09	7.44	6.91
10-Nov-09	7.41	6.91
10-Dec-09	7.32	6.73
10-Jan-10	7.05	6.63
10-Feb-10	7	6.8
10-Mar-10	7	6.5
10-Apr-10	7.1	6.2
10-May-10	7	6.6
10-Jun-10	8.24	6.29
10-Jul-10	7.23	6.93
10-Aug-10	7.26	6.94
10-Sep-10	7.24	6.84
10-Oct-10	7.29	6.72
10-Nov-10	7.26	6.71
10-Dec-10	7.12	6.77
10-Jan-11	7.3	6.7
10-Feb-11	7.1	6.7
10-Mar-11	7.1	6.4
10-Apr-11	7.2	6.7
10-May-11	7.2	6.6
10-Jun-11	7.56	6.82
10-Jul-11	7.31	6.82
10-Aug-11	7.34	6.8
10-Sep-11	7.54	7.03
10-Oct-11	7.5	7.02
10-Nov-11	7.56	6.94
10-Dec-11	8.22	7.02
10-Jan-12	7.33	6.96
10-Feb-12	7.3	6.9
90%tile	7.5	
10%tile	7.0	

TSS (mg/L & kg/d)

	Monthly Avg. Conc.	Monthly Avg.	Weekly Avg. Conc.	Weekly Avg. Loading
10-Nov-07	4.7	12.97	6.4	16.83
10-Dec-07	6.9	17.89	10.3	26.26
10-Jan-08	5.5	13.65	8.8	21.38
10-Feb-08	4.24	11.83	4.6	12.58
10-Mar-08	4	11.91	5.3	16.4
10-Apr-08	3.6	11.97	3.8	14.08
10-May-08	2.84	10.31	3.4	12.85
10-Jun-08	5.43	17.25	11.4	37.9
10-Jul-08	9.33	24.56	23.2	61.71
10-Aug-08	2.86	7.53	3.2	9.25
10-Sep-08	2.13	5.77	3.7	9.81
10-Oct-08	2.43	6.68	2.9	7.78
10-Nov-08	3.08	8.1	3.4	9.53
10-Dec-08	3.38	9.65	5.8	15.47
10-Jan-09	3.82	11.64	5.3	15.57
10-Feb-09	81.5	324.4	158.9	635.1
10-Mar-09	7.5	22.9	9.9	30.9
10-Apr-09	4.4	15.9	7.6	31
10-May-09	7	20.5	10.7	31.6
10-Jun-09	4.93	14.86	6.9	18.86
10-Jul-09	6.2	15.84	7.9	19.96
10-Aug-09	4.12	11.04	5.5	13.39
10-Sep-09	1.9	5.13	3.2	9.03
10-Oct-09	4.52	13.36	5.8	18.01
10-Nov-09	5.88	13.42	9.5	23.91
10-Dec-09	4.08	11.41	4.9	12.85
10-Jan-10	4.32	13.98	6.3	21.59
10-Feb-10	5.7	17.5	8.7	24.3
10-Mar-10	3.6	11.6	5.6	17.7
10-Apr-10	3.5	14.6	4.4	12.6
10-May-10	4.1	10.3	3.5	9.1
10-Jun-10	2.48	6.7	4	9.35
10-Jul-10	6.46	14.98	8.5	19.5
10-Aug-10	6.8	18.22	8.6	31.86
10-Sep-10	2.8	6.34	5.8	13.42
10-Oct-10	5.68	12.97	4.3	9.15
10-Nov-10	3.25	8.3	6.1	16.8
10-Dec-10	1.68	3.9	2.8	7.06
10-Jan-11	3.48	7.37	2.8	5.54
10-Feb-11	3.2	8.1	6.2	15.9
10-Mar-11	5.5	14.3	6.1	16.7
10-Apr-11	3.9	10.1	0.6	1.8
10-May-11	4.8	12.8	0.8	2.1
10-Jun-11	4.67	11.78	0.93	2.18
10-Jul-11	4.26	9.37	0.86	1.77
10-Aug-11	3.62	8.51	0.83	1.89
10-Sep-11	3.72	8.42	0.6	1.32
10-Oct-11	5.3	15.38	1.19	3.12
10-Nov-11	7.78	20.46	1.89	5.01
10-Dec-11	6.08	18.65	1	2.98
10-Jan-12	4.95	13.89	0.9	2.9
10-Feb-12	5.9	14.9	1.1	2.8
Minimum	1.68	3.90	0.60	1.32
Maximum	81.50	324.40	158.90	635.10
Average	6.03	18.54	8.21	26.74
2007 Limit	20			
% Ratio	30			
Baseline MF	5/Wk			
MF Reductior	2/Wk			

In accordance with GM10-2003, since there aren't any water quality issues regarding TSS discharged from this facility, the 2012 monitoring frequency has been set to 1/Month.

DO (mg/L)

	Minimum
10-Feb-08	8.5
10-Mar-08	7.8
10-Apr-08	7.6
10-May-08	7.5
10-Feb-09	8
10-Mar-09	8.1
10-Apr-09	8.7
10-May-09	6.7
10-Feb-10	9.5
10-Mar-10	9.4
10-Apr-10	8.7
10-May-10	8.1
10-Feb-11	7.2
10-Mar-11	8.7
10-Apr-11	8.9
10-May-11	6.7
10-Feb-12	9.5
10-Nov-07	6.8
10-Dec-07	7.2
10-Jan-08	7.9
10-Jun-08	6.6
10-Jul-08	6.6
10-Aug-08	6.9
10-Sep-08	6.7
10-Oct-08	7.1
10-Nov-08	7.3
10-Dec-08	7.4
10-Jan-09	8.6
10-Jun-09	7
10-Jul-09	7
10-Aug-09	6.9
10-Sep-09	6.6
10-Oct-09	6.5
10-Nov-09	6.7
10-Dec-09	7.4
10-Jan-10	6.8
10-Jun-10	6.9
10-Jul-10	6.8
10-Aug-10	6.8
10-Sep-10	6.5
10-Oct-10	6.7
10-Nov-10	6.7
10-Dec-10	7.6
10-Jan-11	6.8
10-Jun-11	6.8
10-Jul-11	6.8
10-Aug-11	6.7
10-Sep-11	6.8
10-Oct-11	6.6
10-Nov-11	7.4
10-Dec-11	8.2
10-Jan-12	8.1
Minimum	6.50
Maximum	9.50
Average	7.42

cBOD5 (mg/L & kg/d)

	Monthly Avg. Conc.	Monthly Avg.	Weekly Avg. Conc.	Weekly Avg. Loading
10-Feb-08	<QL	<QL	<QL	<QL
10-Mar-08	<QL	<QL	<QL	<QL
10-Apr-08	<QL	<QL	<QL	<QL
10-May-08	<QL	<QL	<QL	<QL
10-Feb-09	7.8	31.4	31	125.8
10-Mar-09	1.3	3.8	5	15
10-Apr-09	1.5	6.1	6	24.4
10-May-09	5.4	15.9	5	15.2
10-Feb-10	<QL	<QL	<QL	<QL
10-Mar-10	<QL	<QL	<QL	<QL
10-Apr-10	<QL	<QL	<QL	<QL
10-May-10	3.8	10.5	15	41.9
10-Feb-11	<QL	<QL	<QL	<QL
10-Mar-11	<QL	<QL	<QL	<QL
10-Apr-11	<QL	<QL	<QL	<QL
10-May-11	<QL	<QL	<QL	<QL
10-Feb-12	<QL	<QL	<QL	<QL
10-Nov-07	<QL	<QL	<QL	<QL
10-Dec-07	<QL	<QL	<QL	<QL
10-Jan-08	<QL	<QL	<QL	<QL
10-Jun-08	1.8	5.8	7	23.3
10-Jul-08	<QL	<QL	<QL	<QL
10-Aug-08	<QL	<QL	<QL	<QL
10-Sep-08	<QL	<QL	<QL	<QL
10-Oct-08	<QL	<QL	<QL	<QL
10-Nov-08	<QL	<QL	<QL	<QL
10-Dec-08	<QL	<QL	<QL	<QL
10-Jan-09	<QL	<QL	<Ql	<QL
10-Jun-09	<QL	<QL	<QL	<QL
10-Jul-09	2.3	5.4	9	21.7
10-Aug-09	<QL	<QL	<QL	<QL
10-Sep-09	<QL	<QL	<QL	<QL
10-Oct-09	<QL	<QL	<QL	<QL
10-Nov-09	<QL	<QL	<QL	<QL
10-Dec-09	<QL	<QL	<QL	<QL
10-Jan-10	<QL	<QL	<QL	<QL
10-Jun-10	<QL	<QL	<QL	<QL
10-Jul-10	<QL	<QL	<QL	<QL
10-Aug-10	<QL	<QL	<QL	<QL
10-Sep-10	<QL	<QL	<QL	<QL
10-Oct-10	<QL	<QL	<QL	<QL
10-Nov-10	<QL	<QL	<QL	<QL
10-Dec-10	<QL	<QL	<QL	<QL
10-Jan-11	<QL	<QL	<QL	<QL
10-Jun-11	1.3	3.5	0.7	2
10-Jul-11	<QL	<QL	<QL	<QL
10-Aug-11	<QL	<QL	<QL	<QL
10-Sep-11	<QL	<QL	<QL	<QL
10-Oct-11	<QL	<QL	<QL	<QL
10-Nov-11	<QL	<QL	<QL	<QL
10-Dec-11	<QL	<QL	<QL	<QL
10-Jan-12	<QL	<QL	<QL	<QL
Minimum	1.30	3.50	0.70	2.00
Maximum	7.80	31.40	31.00	125.80
Average	3.15	10.30	9.84	33.66
2007 Limit	10			
% Ratio	32			
Baseline MF	5/Wk			
MF Reductio	2/Wk			

E.Coli (N/100 mL)

	Monthly GM	Max.
10-Jun-08	2	3
10-Jul-08	4	9
10-Aug-08	1.9	2.1
10-Sep-08	4	6
10-Oct-08	5	7
10-Nov-08	3	4
10-Dec-08	2	3
10-Jan-09	1	1
10-Feb-09	1	2
10-Mar-09	2	2
10-Apr-09	1	1
10-May-09	2	3
10-Jun-09	2	5
10-Jul-09	2	2
10-Aug-09	3	6
10-Sep-09	2	2
10-Oct-09	7	9
10-Nov-09	3	5
10-Dec-09	2	3
10-Jan-10	1	1
10-Feb-10	1	2
10-Mar-10	2	4
10-Apr-10	1	1
10-May-10	1	1
10-Jun-10	1	1
10-Jul-10	2	2
10-Aug-10	2	2
10-Sep-10	1	1
10-Oct-10	2	2
10-Nov-10	1	1
10-Dec-10	2	3
10-Jan-11	2	5
10-Feb-11	1	2
10-Mar-11	2	2
10-Apr-11	1	1
10-May-11	1	1
10-Jun-11	1	1
10-Jul-11	1	1
10-Aug-11	2	2
10-Sep-11	3	3
10-Oct-11	5	8
10-Nov-11	2	2
10-Dec-11	1	1
10-Jan-12	1	1
10-Feb-12	1	1

TKN (mg/L & kg/d)

	Monthly Avg. Conc.	Monthly Avg.	Weekly Avg. Conc.	Weekly Avg. Loading
10-Nov-07	1.2	3.34	1.2	3.24
10-Dec-07	1.6	4.06	1.7	4.56
10-Jan-08	1.6	4.36	1.7	4.55
10-Jun-08	1.5	4.79	2.1	6.44
10-Jul-08	1.4	3.76	1.6	4.13
10-Aug-08	1.2	3.12	1.2	3.38
10-Sep-08	1.2	2.99	1.3	3.83
10-Oct-08	1.2	3.29	1.2	3.34
10-Nov-08	1.2	3.11	1.2	3.18
10-Dec-08	1.4	3.8	1.8	4.88
10-Jan-09	1.2	3.87	1.3	4.11
10-Jun-09	1.6	4.95	1.7	6.15
10-Jul-09	1.6	4.22	1.7	4.7
10-Aug-09	1.3	3.44	1.3	3.5
10-Sep-09	1.3	3.61	1.4	3.85
10-Oct-09	1.8	5.03	1.9	5.64
10-Nov-09	1.8	3.99	2.1	5.1
10-Dec-09	1.5	4.8	1.9	7.01
10-Jan-10	1.4	5.35	1.7	6.64
10-Jun-10	0.9	2.38	1.2	3.11
10-Jul-10	1.2	2.72	1.3	2.89
10-Aug-10	1.2	2.68	1.4	2.9
10-Sep-10	1.3	3.02	1.4	3.4
10-Oct-10	1.4	3.05	1.4	3.06
10-Nov-10	1.7	4.67	1.8	4.72
10-Dec-10	1.1	2.57	1.3	2.89
10-Jan-11	1.2	2.71	1.2	2.9
10-Jun-11	1.1	2.7	0.5	1.28
10-Jul-11	1	2.2	0.4	0.99
10-Aug-11	1	2.31	0.5	1.1
10-Sep-11	2	4.71	1.8	3.96
10-Oct-11	2.2	5.84	1.7	4.33
10-Nov-11	1.4	3.57	0.6	1.62
10-Dec-11	1.3	3.63	0.6	1.69
10-Jan-12	1.3	3.42	0.6	1.57
Minimum	0.90	2.20	0.40	0.99
Maximum	2.20	5.84	2.10	7.01
Average	1.38	3.66	1.36	3.73
2007 Limit	3.0			
% Ratio	46			
Baseline MF	5/Wk			
MF Reductior	2/Wk			

Ammonia (mg/L)

	Monthly Avg. Conc.	Weekly Avg. Conc.
10-Feb-08	<QL	<QL
10-Mar-08	0.71	0.71
10-Apr-08	0.61	0.61
10-May-08	0.36	0.36
10-Feb-09	0.33	0.33
10-Mar-09	3	3
10-Apr-09	1.3	1.3
10-May-09	0.63	<QL
10-Feb-10	1.5	1.5
10-Mar-10	<QL	<QL
10-Apr-10	0.8	<QL
10-May-10	<QL	<QL
10-Feb-11	0.55	0.55
10-Mar-11	0.34	0.34
10-Apr-11	0.86	<QL
10-May-11	0.22	0.22
10-Feb-12	0.52	0.52
Minimum	0.22	0.22
Maximum	3.00	3.00
Average	0.84	0.86
2007 Limit	13.5	
% Ratio	6	
Baseline MF	5/Week	
MF Reductior	1/Week	

The baseline monitoring frequency for Ammonia is currently 5 Days per Week in accordance with GM10-2003 (MN-2, Pg.2). For the 2012 permit, it was determined that an Ammonia limitation is not necessary to maintain Water Quality Standards in the receiving stream, and therefore the former limitation of 13.5 mg/L has been carried forward in order to prevent backsliding. The former limitation was derived during a period of time in which the baseline monitoring frequency for Ammonia was 1 per Month. If the former numeric limitation were carried forward to the 2012 permit and the monitoring frequency were increased to match the current baseline monitoring frequency, the result would be a relaxed Ammonia limitation, and thus a violation of antibacksliding policies. In order maintain antibacksliding policies, both the monitoring frequency of 1 per Month and the numeric limitation of 13.5 mg/L have been carried forward to the 2012 permit.

Zinc, Tot.Rec. (mg/L)

	Monthly Avg. Conc.	Weekly Avg. Conc.
10-Apr-08	<QL	<QL
10-Oct-08	<QL	<QL
10-Apr-09	<QL	<QL
10-Oct-09	<QL	<QL
10-Apr-10	<QL	<QL
10-Oct-10	<QL	<QL
10-Apr-11	<QL	<QL
10-Oct-11	0.025	0.025
2007 Limit	0.075	
% Ratio	33	
Baseline MF	1/Mo	
MF Reductior	1/Qtr.	

CASRN#	CHEMICAL	REQUIRED EPA ANALYSIS NO.	REQUIRED QL (µg/L)	TEST REQUIRED IN:		REPORTING RESULTS BY SAMPLE DATE							
						8/10/2010		9/1/2010 & 9/15/2010		1/25/2012		2/8/2012	
				Att. A	Form 2A	EPA ANALYSIS USED	RESULT (µg/L)	EPA ANALYSIS USED	RESULT (µg/L)	EPA ANALYSIS USED	RESULT (µg/L)	EPA ANALYSIS USED	RESULT (µg/L)
METALS (DISSOLVED)													
7440-36-0	Antimony, dissolved	(3)	1.4	√				200.8	<0.50	200.8	<1.0	200.8	<1.0
7440-38-2	Arsenic, dissolved	(3)	1.0	√				200.8	<1.0	200.8	<1.0	200.8	<1.0
7440-39-3	Barium, dissolved	(3)	200	√									
	Berylium, dissolved	--	--					200.8	<0.10	200.8	<0.10	200.8	<0.10
7440-43-9	Cadmium, dissolved	(3)	0.3	√				200.8	<0.1	200.8	<0.1	200.8	<0.1
16065-83-1	Chromium III, dissolved	(3)	3.6	√				200.8	<1.0 (total chromium)	200.8	<1.0 (total chromium)	200.8	<1.0 (total chromium)
18540-29-9	Chromium VI, dissolved	(3)	1.6	√				200.8	<1.0 (total chromium)	200.8	<1.0 (total chromium)	200.8	<1.0 (total chromium)
7440-50-8	Copper, dissolved	(3)	0.50	√				200.8	1.88	200.8	1.4	200.8	1.67
7439-89-6	Iron, dissolved	(3)	30	√									
7439-92-1	Lead, dissolved	(3)	0.50	√				200.8	<0.10	200.8	<0.10	200.8	<0.10
7439-96-5	Manganese, dissolved	(3)	5.0	√									
7439-97-6	Mercury, dissolved	(3)	1.0	√				245.1	<0.10	245.1	<0.10	245.1	<0.10
7440-02-0	Nickel, dissolved	(3)	0.94	√				200.8	0.74	200.8	<0.50	200.8	0.50
7782-49-2	Selenium, dissolved	(3)	2.0	√				200.8	<0.50	200.8	<0.50	200.8	<0.50
7440-22-4	Silver, dissolved	(3)	0.20	√				200.8	<0.05	200.8	<0.10	200.8	<0.10
7440-28-0	Thallium, dissolved	(4)	(5)	√				200.8	<0.10	200.8	<0.10	200.8	<0.10
7440-66-6	Zinc, dissolved	(3)	2.0	√				200.8	23.8	200.8	30.2	200.8	31.1
METALS (TOTAL RECOVERABLE)													
	Antimony, total recoverable	--	--		√	200.8	<0.50						
	Arsenic, total recoverable	--	--		√	200.8	<1.0						
	Berylium, total recoverable	--	--		√	200.8	<0.10						
	Cadmium, total recoverable	--	--		√	200.8	<0.1						
	Chromium, total	--	--		√	200.8	<1.0						
	Copper, total recoverable	--	--		√	200.8	7.39						
	Lead, total recoverable	--	--		√	200.8	0.56						
	Mercury, total recoverable	--	--		√								
	Nickel, total recoverable	--	--		√	200.8	0.98						
7782-49-2	Selenium, total recoverable	(3)	2.0	√	√	200.8	<0.50						
	Silver, total recoverable	--	--		√	200.8	<0.10						
	Thallium, total recoverable	--	--		√	200.8	<0.10						
	Zinc, total recoverable	--	--		√	200.8	27.6						
	Total Phenolic Compounds	--	--		√			420.4	<50	LACH 10-210-00-1-	<50	LACH 10-210-00-1-	<50
PESTICIDES/PCB'S													
309-00-2	Aldrin	608	0.05	√				608	<0.05				
57-74-9	Chlordane	608	0.2	√				608	ND				
2921-88-2	Chlorpyrifos (synonym = Dursban)	(4)	(5)	√				622	<0.10				
72-54-8	DDD	608	0.1	√				608	<0.05				
72-55-9	DDE	608	0.1	√				608	<0.05				
50-29-3	DDT	608	0.1	√				608	<0.05				
8065-48-3	Demeton	(4)	(5)	√				622	<0.10				
333-41-5	Diazinon	(4)	(5)	√				608	<0.10				
60-57-1	Dieldrin	608	0.1	√				608	<0.05				
959-98-8	Alpha-Endosulfan	608	0.1	√				608	<0.05				
33213-65-9	Beta-Endosulfan	608	0.1	√				608	<0.05				
1031-07-8	Endosulfan Sulfate	608	0.1	√				608	<0.05				

CASRN#	CHEMICAL	REQUIRED EPA ANALYSIS NO.	REQUIRED QL (µg/L)	TEST REQUIRED IN:		REPORTING RESULTS BY SAMPLE DATE							
						8/10/2010		9/1/2010 & 9/15/2010		1/25/2012		2/8/2012	
				Att. A	Form 2A	EPA ANALYSIS USED	RESULT (µg/L)	EPA ANALYSIS USED	RESULT (µg/L)	EPA ANALYSIS USED	RESULT (µg/L)	EPA ANALYSIS USED	RESULT (µg/L)
72-20-8	Endrin	608	0.1	√				608	<0.05				
7421-93-4	Endrin Aldehyde	(4)	(5)	√				608	<0.05				
86-50-0	Guthion	(4)	(5)	√				622	<0.10				
76-44-8	Heptachlor	608	0.05	√				608	<0.05				
1024-57-3	Heptachlor Epoxide	(4)	(5)	√				608	<0.05				
319-84-6	Hexachlorocyclohexane Alpha-BHC	608	(5)	√				608	<0.05				
319-85-7	Hexachlorocyclohexane Beta-BHC	608	(5)	√				608	<0.05				
58-89-9	Hexachlorocyclohexane Gamma-BHC or Lindane	608	(5)	√				608	<0.05				
143-50-0	Kepone	(9)	(5)	√				608	<0.08				
121-75-5	Malathion	(4)	(5)	√				622	<0.10				
72-43-5	Methoxychlor	(4)	(5)	√				608	<0.05				
2385-85-5	Mirex	(4)	(5)	√				608	<0.05				
56-38-2	Parathion	(4)	(5)	√				622	<0.10				
1336-36-3	PCB Total	608	7	√				608	ND				
8001-35-2	Toxaphene	608	5	√				608	ND				
BASE NEUTRAL EXTRACTABLES													
83-32-9	Acenaphthene	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
	Acenaphthylene	--	--		√			625	<10.0	625	<10.0	625	<10.0
120-12-7	Anthracene	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
92-87-5	Benzidine	(4)	(5)	√	√			625	<10.0	625	<10.0	625	<10.0
56-55-3	Benzo (a) anthracene	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
205-99-2	Benzo (b) fluoranthene (synonym =3,4 Benzo-	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
207-08-9	Benzo (k) fluoranthene	625	10	√				625	<10.0	625	<10.0	625	<10.0
50-32-8	Benzo (a) pyrene	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
	Benzo (GHI) Perylene	--	--		√			625	<10.0	625	<10.0	625	<10.0
	Bis (2-Cloroethoxy) Methane	--	--		√			625	<10.0	625	<10.0	625	<10.0
111-44-4	Bis (2-Chloroethyl) Ether	(4)	(5)	√	√			625	<10.0	625	<10.0	625	<10.0
108-60-1	Bis (2-Chloroisopropyl) Ether	(4)	(5)	√	√			625	<10.0	625	<10.0	625	<10.0
	4-Bromophenyl Phenyl Ether	--	--		√			625	<10.0	625	<10.0	625	<10.0
85-68-7	Butyl benzyl phthalate	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
91-58-7	2-Chloronaphthalene	(4)	(5)	√	√			625	<10.0	625	<10.0	625	<10.0
	4-Chlorophenyl Phenyl Ether	--	--		√			625	<10.0	625	<10.0	625	<10.0
218-01-9	Chrysene	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
53-70-3	Dibenz(a,h)anthracene	625	20	√	√			625	<10.0	625	<10.0	625	<10.0
84-74-2	Dibutyl phthalate (synonym = Di-n-Butyl	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
	Di-n-octyl phthalate	--	--		√			625	<10.0	625	<10.0	625	<10.0
95-50-1	1,2-Dichlorobenzene	624	10	√	√			624	<10.0	624	<10.0	624	<10.0
541-73-1	1,3-Dichlorobenzene	624	10	√	√			624	<10.0	624	<10.0	624	<10.0
106-46-7	1,4-Dichlorobenzene	624	10	√	√			624	<10.0	624	<10.0	624	<10.0
91-94-1	3,3-Dichlorobenzidine	(4)	(5)	√	√			625	<10.0	625	<10.0	625	<10.0
84-66-2	Diethyl phthalate	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
117-81-7	Bis-2-ethylhexyl phthalate	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
131-11-3	Dimethyl phthalate	(4)	(5)	√	√			625	<10.0	625	<10.0	625	<10.0
121-14-2	2,4-Dinitrotoluene	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
	2,6-Dinitrotoluene	--	--		√			625	<10.0	625	<10.0	625	<10.0
122-66-7	1,2-Diphenylhydrazine	(4)	(5)	√	√			625	<10.0	625	<10.0	625	<10.0
206-44-0	Fluoranthene	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
86-73-7	Fluorene	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
118-74-1	Hexachlorobenzene	(4)	(5)	√	√			625	<10.0	625	<10.0	625	<10.0
87-68-3	Hexachlorobutadiene	(4)	(5)	√	√			625	<10.0	625	<10.0	625	<10.0

Effluent Screening - 2012 Permit Reissuance

CASRN#	CHEMICAL	REQUIRED EPA ANALYSIS NO.	REQUIRED QL (µg/L)	TEST REQUIRED IN:		REPORTING RESULTS BY SAMPLE DATE							
						8/10/2010		9/1/2010 & 9/15/2010		1/25/2012		2/8/2012	
				Att. A	Form 2A	EPA ANALYSIS USED	RESULT (µg/L)	EPA ANALYSIS USED	RESULT (µg/L)	EPA ANALYSIS USED	RESULT (µg/L)	EPA ANALYSIS USED	RESULT (µg/L)
77-47-4	Hexachlorocyclopentadiene	(4)	(5)	√	√			625	<10.0	625	<10.0	625	<10.0
67-72-1	Hexachloroethane	(4)	(5)	√	√			625	<10.0	625	<10.0	625	<10.0
193-39-5	Indeno(1,2,3-cd)pyrene	625	20	√	√			625	<10.0	625	<10.0	625	<10.0
78-59-1	Isophorone	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
	Naphthalene	--	--		√			625	<10.0	625	<10.0	625	<10.0
98-95-3	Nitrobenzene	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
62-75-9	N-Nitrosodimethylamine	(4)	(5)	√	√			625	<10.0	625	<10.0	625	<10.0
621-64-7	N-Nitrosodi-n-propylamine	(4)	(5)	√	√			625	<10.0	625	<10.0	625	<10.0
86-30-6	N-Nitrosodiphenylamine	(4)	(5)	√	√			625	<10.0	625	<10.0	625	<10.0
	Phenanthrene	--	--		√			625	<10.0	625	<10.0	625	<10.0
129-00-0	Pyrene	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
120-82-1	1,2,4-Trichlorobenzene	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
VOLATILES													
107-02-8	Acrolein	(4)	(5)	√	√			624	<50.0	624	<50.0	624	<50.0
107-13-1	Acrylonitrile	(4)	(5)	√	√			624	<10.0	624	<10.0	624	<10.0
71-43-2	Benzene	624	10	√	√			624	<10.0	624	<10.0	624	<10.0
75-25-2	Bromoform	624	10	√	√			624	<10.0	624	<10.0	624	<10.0
56-23-5	Carbon Tetrachloride	624	10	√	√			624	<10.0	624	<10.0	624	<10.0
108-90-7	Chlorobenzene (synonym = monochlorobenzene)	624	50	√	√			624	<10.0	624	<10.0	624	<10.0
124-48-1	Chlorodibromomethane	624	10	√	√			624	<10.0	624	<10.0	624	<10.0
	Chloroethane	--	--		√			624	<10.0	624	<10.0	624	<10.0
	2-Chloro-Ethylvinyl Ether	--	--		√			624	<10.0	624	<10.0	624	<10.0
67-66-3	Chloroform	624	10	√	√			624	<10.0	624	<10.0	624	<10.0
75-09-2	Dichloromethane (synonym = methylene chloride)	624	20	√				624	<10.0	624	<10.0	624	<10.0
75-27-4	Dichlorobromomethane	624	10	√	√			624	<10.0	624	<10.0	624	<10.0
	1,1-Dichloroethane	--	--		√			624	<10.0	624	<10.0	624	<10.0
107-06-2	1,2-Dichloroethane	624	10	√	√			624	<10.0	624	<10.0	624	<10.0
75-35-4	1,1-Dichloroethylene	624	10	√	√			624	<10.0	624	<10.0	624	<10.0
156-60-5	1,2-trans-dichloroethylene	(4)	(5)	√	√			624	<10.0	624	<10.0	624	<10.0
78-87-5	1,2-Dichloropropane	(4)	(5)	√	√			624	<10.0	624	<10.0	624	<10.0
542-75-6	1,3-Dichloropropene (1,3-Dichloropropylene)	(4)	(5)	√	√			624	<20.0	624	<20.0	624	<20.0
100-41-4	Ethylbenzene	624	10	√	√			624	<10.0	624	<10.0	624	<10.0
74-83-9	Methyl Bromide	(4)	(5)	√	√			624	<10.0	624	<10.0	624	<10.0
	Methyl Chloride	--	--		√			624	<10.0	624	<10.0	624	<10.0
	Methylene Chloride	--	--		√			624	<10.0	624	<10.0	624	<10.0
79-34-5	1,1,2,2-Tetrachloroethane	(4)	(5)	√	√			624	<10.0	624	<10.0	624	<10.0
127-18-4	Tetrachloroethylene	624	10	√	√			624	<10.0	624	<10.0	624	<10.0
10-88-3	Toluene	624	10	√	√			624	<10.0	624	<10.0	624	<10.0
	1,1,1-Trichloroethane	--	--		√			624	<10.0	624	<10.0	624	<10.0
79-00-5	1,1,2-Trichloroethane	(4)	(5)	√	√			624	<10.0	624	<10.0	624	<10.0
79-01-6	Trichloroethylene	624	10	√	√			624	<10.0	624	<10.0	624	<10.0
75-01-4	Vinyl Chloride	624	10	√	√			624	<10.0	624	<10.0	624	<10.0
ACID EXTRACTABLES													
	p-Chloro-m-Cresol	--	--		√			625	<10.0	625	<10.0	625	<10.0
95-57-8	2-Chlorophenol	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
120-83-2	2,4 Dichlorophenol	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
105-67-9	2,4 Dimethylphenol	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
	4,6-Dinitro-o-Cresol	--	--		√			625	<10.0	625	<10.0	625	<10.0
51-28-5	2,4-Dinitrophenol	(4)	(5)	√	√			625	<10.0	625	<10.0	625	<10.0
	2-Nitrophenol	--	--		√			625	<10.0	625	<10.0	625	<10.0
	4-Nitrophenol	--	--		√			625	<10.0	625	<10.0	625	<10.0
534-52-1	2-Methyl-4,6-Dinitrophenol	(4)	(5)	√				625	<10.0	625	<10.0	625	<10.0
25154-52-3	Nonylphenol	(5)	(5)	√				625	<10.0				
87-86-5	Pentachlorophenol	625	50	√	√			625	<10.0	625	<10.0	625	<10.0
108-95-2	Phenol	625	10	√	√			625	<10.0	625	<10.0	625	<10.0

Lawrenceville Wastewater Treatment Plant (VA0020354)

Effluent Screening - 2012 Permit Reissuance

CASRN#	CHEMICAL	REQUIRED EPA ANALYSIS NO.	REQUIRED QL (µg/L)	TEST REQUIRED IN:		REPORTING RESULTS BY SAMPLE DATE							
						8/10/2010		9/1/2010 & 9/15/2010		1/25/2012		2/8/2012	
				Att. A	Form 2A	EPA ANALYSIS USED	RESULT (µg/L)	EPA ANALYSIS USED	RESULT (µg/L)	EPA ANALYSIS USED	RESULT (µg/L)	EPA ANALYSIS USED	RESULT (µg/L)
88-06-2	2,4,6-Trichlorophenol	625	10	√	√			625	<10.0	625	<10.0	625	<10.0
	RADIONUCLIDES												
	Beta Particle & Photon	(4)	(5)	√									
	Gross Alpha Particle Activity	(4)	(5)	√									
	Combined Radium 226 and	(4)	(5)	√									
	Uranium	(4)	(5)	√									
	MISCELLANEOUS												
776-41-7	Ammonia as NH3-N	350.1	200	√				350.1	930	LACH 10-107-06-1-C	680	LACH 10-107-06-1-C	590
16887-00-6	Chlorides	(4)	(5)	√									
7782-50-5	Chlorine Produced Oxidant	(4)	(5)	√									
7782-50-5	Chlorine, Total Residual	(4)	100	√									
57-12-5	Cyanide, Free	(4)	10	√				335.4	<10 (total)	LACH 10-204-00-1-X	<10 (total)	LACH 10-204-00-1-X	<10 (total)
94-75-7	2,4 Dichlorophenoxy acetic acid (synonym = 2,4-D)	(4)	(5)	√									
1746-01-6	Dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin)	1613	0.00001	√									
N/A	*E. coli* / *Enterococcus* (N/CML)	(4)	(5)	√				Reported on Form 2A, see summary page of Form 2A testing results.					
N/A	Foaming Agents (as MBAS)	(4)	(5)	√									
6/4/7783	Hydrogen Sulfide	(5)	(5)	√				ASTM D 4658-03	<100				
14797-55-8	Nitrate as N (mg/L)	(4)	(5)	√	√			353.2	790	LACH 10-107-04-1-A	1120	LACH 10-107-04-1-A	1280
N/A	Sulfate (mg/L)	(4)	(5)	√									
N/A	Total Dissolved Solids	(4)	(5)	√	√			SM 2540C	223000	SM 2540C	219000	SM 2540C	199000
60-10-5	Tributyltin	NBSR 85-3-295	(5)	√				Unger	<0.0030				
93-72-1	2-(2,4,5-Trichlorophenoxy) propionic acid (synonym =	(4)	(5)	√									
	Hardness (mg/L as $CaCO_3$)	(4)	(5)	√	√			SM 2340B	39500	SM 2340B	36700	SM 2340B	38000
	OTHER POLLUTANTS REPORTED												
	Total Kjeldahl Nitrogen	--	--		√			350.1	930	LACH 10-107-06-2-I	680	LACH 10-107-06-2-I	1330
	Total Phosphorus	--	--		√			365.1	280	LACH 10-115-01-1-E	<200	LACH 10-115-01-1-E	210
	Oil & Grease HEM	--	--		√			1664A	6400	1664A	<5000	1664A	<5000

= Reported greater than QL

Black font = Required for 2012 application

Gray font = Not required for 2012 application, but may have been reported by laboratory

Lawrenceville Wastewater Treatment Plant (VA0020354)
Data Reported on Form 2A - 2012 Permit Reissuance

Outfall Number: 001

Parameter	Maximum Daily Value		Average Daily Value		
	Value	Units	Value	Units	Number of Samples
pH (minimum)	6.2	s.u.			
pH (maximum)	8.24	s.u.			
Flow Rate	2.847050	MGD	0.715074	MGD	1826
Temperature (Winter)	19.4	°C	13.4	°C	Daily/Permit
Temperature (Summer)	28.7	°C	25.9	°C	Daily/Permit

Pollutant		Maximum Daily Discharge		Average Daily Discharge			Analytical Method	ML/MDL
		Conc.	Units	Conc.	Units	Number of Samples		
CONVENTIONAL AND NON-CONVENTIONAL COMPOUNDS								
Biochemical Oxygen Demand (report one)	BOD-5							
	CBOD-5	31	mg/L	0.62	mg/L	417	SM 5210	5 mg/L
Fecal Coliform		888	cfu/100mL	19	cfu/100mL	1290	SM 9223	1 cfu/100 mL
Total Suspended Solids (TSS)		158.93	mg/L	9.78	mg/L	394	160.2	5 mg/L

Pollutant	Maximum Daily Discharge		Average Daily Discharge			Analytical Method	ML/MDL
	Conc.	Units	Conc.	Units	Number of Samples		
CONVENTIONAL AND NON-CONVENTIONAL COMPOUNDS							
Ammonia (as N)	3.00	mg/L	0.84	mg/L	23	350.1	0.20
Chlorine (TRC)	N/A						
Dissolved Oxygen	12.06	mg/L	8.33	mg/L	1826	SM 4500-00	0.0
Total Kjeldahl Nitrogen (TKN)	2.13	mg/L	1.39	mg/L	572	351.4	0.10
Nitrate Plus Nitrite Nitrogen	1.28	mg/L	1.06	mg/L	3	353.2	0.10
Oil & Grease	6.4	mg/L	5.5	mg/L	3	1664A	5.0
Phosphorus (total)	0.28	mg/L	0.23	mg/L	3	365.1	0.01
Total Dissolved Solids	359	mg/L	440	mg/L	3	SM 2540C	1.0
Other	N/A						

Lawrenceville Wastewater Treatment Plant (Permit # VA0020354)

Monthly Average Effluent Temperatures for 2007-2011

Month	MONTHLY AVERAGE TEMPERATURE (˚C)					5-YEAR MONTHLY STATISTICS (˚C)			
	2007	2008	2009	2010	2011	Avg.	Min.	Max.	90th Percentile (High Flow Months)
January	13.9	13.0	12.4	11.2	11.4	12.4	11.2	13.9	**17.3**
February	11.9	13.8	11.9	9.7	12.5	11.9	9.7	13.8	
March	15.2	15.2	13.2	13.2	14.1	14.2	13.2	15.2	
April	17.3	17.3	16.4	17.3	17.4	17.1	16.4	17.4	
May	20.8	20.2	20.4	20.4	20.5	20.4	20.2	20.8	
June	23.6	24.7	23.5	24.9	24.8	24.3	23.5	24.9	
July	25.8	26.0	25.3	26.4	26.4	26.0	25.3	26.4	
August	27.4	26.4	26.7	26.9	26.4	26.8	26.4	27.4	
September	25.1	24.1	23.2	24.3	24.4	24.2	23.2	25.1	
October	22.1	20.2	20.0	20.4	20.4	20.6	20.0	22.1	
November	17.1	16.6	16.4	17.1	17.1	16.9	16.4	17.1	
December	15.1	14.3	13.6	13.4	15.7	14.4	13.4	15.7	
Avg.	20.1	19.9	19.1	19.4	20.0				
Min.	11.9	13.8	11.9	9.7	12.5				
Max.	27.4	26.4	26.7	26.9	26.4				
90th Percentile (All Data)	**26.4**								

Lawrenceville Wastewater Treatment Plant (Permit # VA0020354)
Total Recoverable Zinc (mg/L): 2002-2011

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
January		0.027	0.037		0.043	0.022				
February		0.044	0.029		0.036					
March		0.035	0.038		0.038					
April		0.028	0.044	0.041			< 0.025	< 0.025	< 0.025	< 0.025
May		0.06	0.026							
June		0.033	0.049	0.039						
July	0.046	0.065	0.04	0.04	0.024					
August	0.059	0.031		0.034	0.03					
September	0.04	0.039	0.02	0.07	0.038					
October	0.051	0.042		0.068	0.036		< 0.025	< 0.025	< 0.025	0.025
November	0.072	0.041		0.046						
December	0.069	0.04	0.037	0.043	0.026					

Attachment G

Effluent Screening and Limitation Evaluations

MSTRANTI DATA SOURCE REPORT

Lawrenceville Wastewater Treatment Plant
2012 Permit Reissuance

Stream Information	
Mean Hardness	Calculated from data collected from monitoring station 5ARSE001.22 (See Attachment D)
90% Temperature (annual)	
90% Temperature (wet season)	
90% Maximum pH	
10% Maximum pH	
Tier Designation	Flow Frequency Analysis: April 12, 2012 by J.V.Palmore, PG (See Attachment A)
Stream Flows	
All Data	Flow Frequency Analysis: April 12, 2012 by J.V.Palmore, PG (See Attachment A)
Mixing Information	
All Data	MIX.exe (See Attachment G)
Effluent Information	
Mean Hardness	Calculated or transcribed from data provided by the permittee through permit monitoring reports, application Form 2A, Attachment A, or submitted by request during the drafting phase for the 2012 permit (See Attachment F)
90% Temperature (annual)	
90% Temperature (wet season)	
90% Maximum pH	
10% Maximum pH	
Discharge Flow	

Mixing Zone Predictions for Lawrenceville WWTP: VA0020354 (2012 Permit)

Effluent Flow = 1.2 MGD
Stream 7Q10 = .372 MGD
Stream 30Q10 = .626 MGD
Stream 1Q10 = .317 MGD
Stream slope = .002083 ft/ft
Stream width = 6 ft
Bottom scale = 1
Channel scale = 2

◄ Ambient flows used for this mixing zone analysis are derived from the April 12, 2012 Flow Frequency Analysis by J.V. Palmore, PG (See Attachment A)

◄ Stream characteristics used for this mixing zone analysis are derived from the water model analysis by Paul Herman (March 1996) included in Attachment D.

Mixing Zone Predictions @ 7Q10

Depth = .5154 ft
Length = 78.82 ft
Velocity = .7867 ft/sec
Residence Time = .0012 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = .5673 ft
Length = 72.05 ft
Velocity = .8304 ft/sec
Residence Time = .001 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = .5038 ft
Length = 80.5 ft
Velocity = .7766 ft/sec
Residence Time = .0288 hours

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 1Q10 may be used.

Virginia DEQ Mixing Zone Analysis Version 2.1

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Lawrenceville WWTP Permit No.: VA0020354

Receiving Stream: Roses Creek Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information			Stream Flows			Mixing Information			Effluent Information		
Mean Hardness (as CaCO3) =	25.3	mg/L	1Q10 (Annual) =	0.317	MGD	Annual - 1Q10 Mix =	100	%	Mean Hardness (as CaCO3) =	38.1	mg/L
90% Temperature (Annual) =	22.9	deg C	7Q10 (Annual) =	0.372	MGD	- 7Q10 Mix =	100	%	90% Temp (Annual) =	26.4	deg C
10% Temperature (Annual) =	4.4	deg C	30Q10 (Annual) =	0.626	MGD	- 30Q10 Mix =	100	%	90% Temp (Wet season) =	17.3	deg C
90% Temperature (Wet season) =	12.3	deg C	1Q10 (Wet season) =	2.62	MGD	Wet Season - 1Q10 Mix =	100	%	90% Maximum pH =	7.5	SU
90% Maximum pH =	7.4	SU	30Q10 (Wet season) =	5.17	MGD	- 30Q10 Mix =	100	%	10% Maximum pH =	7	SU
10% Maximum pH =	6.4	SU	30Q5 =	0.973	MGD				Heated Discharge? (Y/N) =	N	
Tier Designation (1 or 2) =	1		Harmonic Mean =	3.88	MGD				Discharge Flow =	1.2	MGD
Public Water Supply (PWS) Y/N? =	N										
Trout Present Y/N? =	N										
Early Life Stages Present Y/N? =	Y										

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**				Lowest LTA
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**	
Acenapthene	0	--	--	na	9.9E+02	--	--	na	1.8E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E+03**	--
Acrolein	0	--	--	na	9.3E+00	--	--	na	1.7E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+01**	--
Acrylonitrile [C]	0	--	--	na	2.5E+00	--	--	na	1.1E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+01**	--
Aldrin [C]	0	3.0E+00	--	na	5.0E-04	3.8E+00	--	na	2.1E-03	--	--	--	--	--	--	--	--	**3.8E+00**	**--**	**na**	**2.1E-03**	1.56E+00
Ammonia-N (mg/l) (Yearly)	0	2.06E+01	2.26E+00	na	--	2.60E+01	3.44E+00	na	--	--	--	--	--	--	--	--	--	**2.60E+01**	**3.44E+00**	**na**	**--**	2.07E+00
Ammonia-N (mg/l) (High Flow)	0	2.21E+01	4.67E+00	na	--	7.0E+01	2.5E+01	na	--	--	--	--	--	--	--	--	--	**7.02E+01**	**2.48E+01**	**na**	**--**	1.49E+01
Anthracene	0	--	--	na	4.0E+04	--	--	na	7.2E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.2E+04**	--
Antimony	0	--	--	na	6.4E+02	--	--	na	1.2E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+03**	--
Arsenic	0	3.4E+02	1.5E+02	na	--	4.3E+02	2.0E+02	na	--	--	--	--	--	--	--	--	--	**4.3E+02**	**2.0E+02**	**na**	**--**	1.18E+02
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**	--
Benzene [C]	0	--	--	na	5.1E+02	--	--	na	2.2E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.2E+03**	--
Benzidine [C]	0	--	--	na	2.0E-03	--	--	na	8.5E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.5E-03**	--
Benzo (a) anthracene [C]	0	--	--	na	1.8E-01	--	--	na	7.6E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.6E-01**	--
Benzo (b) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	7.6E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.6E-01**	--
Benzo (k) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	7.6E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.6E-01**	--
Benzo (a) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	7.6E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.6E-01**	--
Bis2-Chloroethyl Ether [C]	0	--	--	na	5.3E+00	--	--	na	2.2E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.2E+01**	--
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	1.2E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+05**	--
Bis 2-Ethylhexyl Phthalate [C]	0	--	--	na	2.2E+01	--	--	na	9.3E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.3E+01**	--
Bromoform [C]	0	--	--	na	1.4E+03	--	--	na	5.9E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.9E+03**	--
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	3.4E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.4E+03**	--
Cadmium	0	1.2E+00	5.0E-01	na	--	1.5E+00	6.5E-01	na	--	--	--	--	--	--	--	--	--	**1.5E+00**	**6.5E-01**	**na**	**--**	3.92E-01
Carbon Tetrachloride [C]	0	--	--	na	1.6E+01	--	--	na	6.8E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.8E+01**	--
Chlordane [C]	0	2.4E+00	4.3E-03	na	8.1E-03	3.0E+00	5.6E-03	na	3.4E-02	--	--	--	--	--	--	--	--	**3.0E+00**	**5.6E-03**	**na**	**3.4E-02**	3.39E-03
Chloride	0	8.6E+05	2.3E+05	na	--	1.1E+06	3.0E+05	na	--	--	--	--	--	--	--	--	--	**1.1E+06**	**3.0E+05**	**na**	**--**	1.81E+05
TRC	0	1.9E+01	1.1E+01	na	--	2.4E+01	1.4E+01	na	--	--	--	--	--	--	--	--	--	**2.4E+01**	**1.4E+01**	**na**	**--**	8.66E+00
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	2.9E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.9E+03**	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**				Lowest LTA
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**	
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	5.5E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.5E+02**	--
Chloroform	0	--	--	na	1.1E+04	--	--	na	2.0E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.0E+04**	--
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	2.9E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.9E+03**	--
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	2.7E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.7E+02**	--
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	1.0E-01	5.4E-02	na	--	--	--	--	--	--	--	--	--	**1.0E-01**	**5.4E-02**	**na**	**--**	3.23E-02
Chromium III	0	2.4E+02	3.1E+01	na	--	3.1E+02	4.1E+01	na	--	--	--	--	--	--	--	--	--	**3.1E+02**	**4.1E+01**	**na**	**--**	2.47E+01
Chromium VI	0	1.6E+01	1.1E+01	na	--	2.0E+01	1.4E+01	na	--	--	--	--	--	--	--	--	--	**2.0E+01**	**1.4E+01**	**na**	**--**	8.31E+00
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**	--
Chrysene [C]	0	--	--	na	1.8E-02	--	--	na	7.6E-02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.6E-02**	--
Copper	0	5.1E+00	3.7E+00	na	--	6.4E+00	4.8E+00	na	--	--	--	--	--	--	--	--	--	**6.4E+00**	**4.8E+00**	**na**	**--**	2.63E+00
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	2.8E+01	6.8E+00	na	2.9E+04	--	--	--	--	--	--	--	--	**2.8E+01**	**6.8E+00**	**na**	**2.9E+04**	4.09E+00
DDD [C]	0	--	--	na	3.1E-03	--	--	na	1.3E-02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.3E-02**	--
DDE [C]	0	--	--	na	2.2E-03	--	--	na	9.3E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.3E-03**	--
DDT [C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.4E+00	1.3E-03	na	9.3E-03	--	--	--	--	--	--	--	--	**1.4E+00**	**1.3E-03**	**na**	**9.3E-03**	7.87E-04
Demeton	0	--	1.0E-01	na	--	--	1.3E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.3E-01**	**na**	**--**	7.87E-02
Diazinon	0	1.7E-01	1.7E-01	na	--	2.1E-01	2.2E-01	na	--	--	--	--	--	--	--	--	--	**2.1E-01**	**2.2E-01**	**na**	**--**	8.83E-02
Dibenz(a,h)anthracene [C]	0	--	--	na	1.8E-01	--	--	na	7.6E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.6E-01**	--
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	2.4E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.4E+03**	--
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+03**	--
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	3.4E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.4E+02**	--
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	1.2E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+00**	--
Dichlorobromomethane [C]	0	--	--	na	1.7E+02	--	--	na	7.2E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.2E+02**	--
1,2-Dichloroethane [C]	0	--	--	na	3.7E+02	--	--	na	1.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+03**	--
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	1.3E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.3E+04**	--
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.8E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E+04**	--
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	5.3E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.3E+02**	--
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**	--
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	6.4E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.4E+02**	--
1,3-Dichloropropene [C]	0	--	--	na	2.1E+02	--	--	na	8.9E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.9E+02**	--
Dieldrin [C]	0	2.4E-01	5.6E-02	na	5.4E-04	3.0E-01	7.3E-02	na	2.3E-03	--	--	--	--	--	--	--	--	**3.0E-01**	**7.3E-02**	**na**	**2.3E-03**	4.41E-02
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	8.0E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.0E+04**	--
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	1.5E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.5E+03**	--
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	2.0E+06	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.0E+06**	--
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	8.1E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.1E+03**	--
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	9.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.6E+03**	--
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	5.1E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.1E+02**	--
2,4-Dinitrotoluene [C]	0	--	--	na	3.4E+01	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+02**	--
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	9.2E-08	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.2E-08**	--
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	8.5E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.5E+00**	--
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.8E-01	7.3E-02	na	1.6E+02	--	--	--	--	--	--	--	--	**2.8E-01**	**7.3E-02**	**na**	**1.6E+02**	4.41E-02
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.8E-01	7.3E-02	na	1.6E+02	--	--	--	--	--	--	--	--	**2.8E-01**	**7.3E-02**	**na**	**1.6E+02**	4.41E-02
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	2.8E-01	7.3E-02	--	--	--	--	--	--	--	--	--	--	**2.8E-01**	**7.3E-02**	**--**	**--**	4.41E-02
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+02**	--
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	1.1E-01	4.7E-02	na	1.1E-01	--	--	--	--	--	--	--	--	**1.1E-01**	**4.7E-02**	**na**	**1.1E-01**	2.83E-02
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	5.4E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.4E-01**	--
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	3.8E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.8E+03**	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**				Lowest LTA
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**	
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	2.5E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.5E+02**	--
Fluorene	0	--	--	na	5.3E+03	--	--	na	9.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.6E+03**	--
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**	--
Guthion	0	--	1.0E-02	na	--	--	1.3E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.3E-02**	**na**	**--**	7.87E-03
Heptachlor [C]	0	5.2E-01	3.8E-03	na	7.9E-04	6.6E-01	5.0E-03	na	3.3E-03	--	--	--	--	--	--	--	--	**6.6E-01**	**5.0E-03**	**na**	**3.3E-03**	2.99E-03
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	3.9E-04	6.6E-01	5.0E-03	na	1.7E-03	--	--	--	--	--	--	--	--	**6.6E-01**	**5.0E-03**	**na**	**1.7E-03**	2.99E-03
Hexachlorobenzene[C]	0	--	--	na	2.9E-03	--	--	na	1.2E-02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E-02**	--
Hexachlorobutadiene[C]	0	--	--	na	1.8E+02	--	--	na	7.6E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.6E+02**	--
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	4.9E-02	--	--	na	2.1E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.1E-01**	--
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	na	1.7E-01	--	--	na	7.2E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.2E-01**	--
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	1.8E+00	1.2E+00	--	na	7.6E+00	--	--	--	--	--	--	--	--	**1.2E+00**	**--**	**na**	**7.6E+00**	4.94E-01
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	2.0E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.0E+03**	--
Hexachloroethane[C]	0	--	--	na	3.3E+01	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+02**	--
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.6E+00	na	--	--	--	--	--	--	--	--	--	**--**	**2.6E+00**	**na**	**--**	1.57E+00
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	7.6E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.6E-01**	--
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**	--
Isophorone[C]	0	--	--	na	9.6E+03	--	--	na	4.1E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.1E+04**	--
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**0.0E+00**	**na**	**--**	0.00E+00
Lead	0	3.2E+01	3.6E+00	na	--	4.0E+01	4.7E+00	na	--	--	--	--	--	--	--	--	--	**4.0E+01**	**4.7E+00**	**na**	**--**	2.80E+00
Malathion	0	--	1.0E-01	na	--	--	1.3E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.3E-01**	**na**	**--**	7.87E-02
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**	--
Mercury	0	1.4E+00	7.7E-01	- -	- -	1.8E+00	1.0E+00	- -	- -	--	--	--	--	--	--	--	--	**1.8E+00**	**1.0E+00**	**- -**	**- -**	6.06E-01
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	2.7E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.7E+03**	--
Methylene Chloride [C]	0	--	--	na	5.9E+03	--	--	na	2.5E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.5E+04**	--
Methoxychlor	0	--	3.0E-02	na	--	--	3.9E-02	na	--	--	--	--	--	--	--	--	--	**--**	**3.9E-02**	**na**	**--**	2.36E-02
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**0.0E+00**	**na**	**--**	0.00E+00
Nickel	0	7.6E+01	8.4E+00	na	4.6E+03	9.6E+01	1.1E+01	na	8.3E+03	--	--	--	--	--	--	--	--	**9.6E+01**	**1.1E+01**	**na**	**8.3E+03**	6.58E+00
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	1.2E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.2E+03**	--
N-Nitrosodimethylamine[C]	0	--	--	na	3.0E+01	--	--	na	1.3E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.3E+02**	--
N-Nitrosodiphenylamine[C]	0	--	--	na	6.0E+01	--	--	na	2.5E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.5E+02**	--
N-Nitrosodi-n-propylamine[C]	0	--	--	na	5.1E+00	--	--	na	2.2E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.2E+01**	--
Nonylphenol	0	2.8E+01	6.6E+00	--	--	3.5E+01	8.6E+00	na	--	--	--	--	--	--	--	--	--	**3.5E+01**	**8.6E+00**	**na**	**--**	5.20E+00
Parathion	0	6.5E-02	1.3E-02	na	--	8.2E-02	1.7E-02	na	--	--	--	--	--	--	--	--	--	**8.2E-02**	**1.7E-02**	**na**	**--**	1.02E-02
PCB Total[C]	0	--	1.4E-02	na	6.4E-04	--	1.8E-02	na	2.7E-03	--	--	--	--	--	--	--	--	**--**	**1.8E-02**	**na**	**2.7E-03**	1.10E-02
Pentachlorophenol [C]	0	7.1E+00	5.3E+00	na	3.0E+01	8.9E+00	6.9E+00	na	1.3E+02	--	--	--	--	--	--	--	--	**8.9E+00**	**6.9E+00**	**na**	**1.3E+02**	3.67E+00
Phenol	0	--	--	na	8.6E+05	--	--	na	1.6E+06	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+06**	--
Pyrene	0	--	--	na	4.0E+03	--	--	na	7.2E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.2E+03**	--
Radionuclides																						
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	--	--
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**	--
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	2.5E+01	6.6E+00	na	7.6E+03	--	--	--	--	--	--	--	--	**2.5E+01**	**6.6E+00**	**na**	**7.6E+03**	3.94E+00
Silver	0	5.8E-01	--	na	--	7.3E-01	--	na	--	--	--	--	--	--	--	--	--	**7.3E-01**	**--**	**na**	**--**	3.01E-01
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**				Lowest LTA
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**	
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	1.7E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+02**	--
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+02**	--
Thallium	0	--	--	na	4.7E-01	--	--	na	8.5E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.5E-01**	--
Toluene	0	--	--	na	6.0E+03	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+04**	--
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**	--
Toxaphene [C]	0	7.3E-01	2.0E-04	na	2.8E-03	9.2E-01	2.6E-04	na	1.2E-02	--	--	--	--	--	--	--	--	**9.2E-01**	**2.6E-04**	**na**	**1.2E-02**	1.57E-04
Tributyltin	0	4.6E-01	7.2E-02	na	--	5.8E-01	9.4E-02	na	--	--	--	--	--	--	--	--	--	**5.8E-01**	**9.4E-02**	**na**	**--**	5.67E-02
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	1.3E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.3E+02**	--
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	6.8E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.8E+02**	--
Trichloroethylene [C]	0	--	--	na	3.0E+02	--	--	na	1.3E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.3E+03**	--
2,4,6-Trichlorophenol [C]	0	--	--	na	2.4E+01	--	--	na	1.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.0E+02**	--
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**	--
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	1.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.0E+02**	--
Zinc	0	4.9E+01	4.9E+01	na	2.6E+04	6.1E+01	6.4E+01	na	4.7E+04	--	--	--	--	--	--	--	--	**6.1E+01**	**6.4E+01**	**na**	**4.7E+04**	2.53E+01

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information. Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	1.2E+03
Arsenic	1.2E+02
Barium	na
Cadmium	3.9E-01
Chromium III	2.5E+01
Chromium VI	8.1E+00
Copper	2.6E+00
Iron	na
Lead	2.8E+00
Manganese	na
Mercury	6.1E-01
Nickel	6.6E+00
Selenium	3.9E+00
Silver	2.9E-01
Zinc	2.5E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

Temperature Screening: (Non-heated Discharge)

NOTE: The temperature screening below roughly evaluates the projected rise in temperature within the mixing zone during low flow conditions using 90%tile effluent temperature, and either 10%tile ambient temperature for heated discharges or 90%tile ambient temperature for non-heated discharges . This screening is for informational purposes only, and should not be used for limitation development.

1Q10 Acute - Maximum Allowable Rise Over Ambient = **2** ˚**C**

Mix 1Q10 Temperature (Non-heated Discharge)

$$\frac{((0.317\ \text{MGD} \times 22.9^{\circ}\text{C}) + (1.2\ \text{MGD} \times 26.4^{\circ}\text{C}))}{(1.517\ \text{MGD})} = 25.67\ ^{\circ}\text{C}$$

ΔT ˚C above ambient ► 25.67 ˚C - 22.9˚C = **2.77 ˚C**

7Q10 Chronic - Maximum Allowable Rise Over Ambient = **3** ˚**C**

Mix 7Q10 Temperature (Non-heated Discharge)

$$\frac{((0.372\ \text{MGD} \times 22.9^{\circ}\text{C}) + (1.2\ \text{MGD} \times 26.4^{\circ}\text{C}))}{(1.572\ \text{MGD})} = 25.57\ ^{\circ}\text{C}$$

ΔT ˚C above ambient ► 25.57 ˚C - 22.9˚C = **2.67 ˚C**

6/8/2012 9:28:41 AM

Facility = Lawrenceville WWTP
Chemical = Ammonia (annual - mg/L)
Chronic averaging period = 30
WLAa = 26
WLAc = 3.44
Q.L. = 0.2
# samples/mo. = 20
# samples/wk. = 5

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 6.94078512135211
Average Weekly limit = 4.52371444842988
Average Monthly LImit = 3.57208733455938

The data are:

9

6/8/2012 9:34:01 AM

Facility = Lawrenceville WWTP
Chemical = Ammonia (Jan-Apr; mg/L)
Chronic averaging period = 30
WLAa = 70.2
WLAc = 24.8
Q.L. = 0.2
# samples/mo. = 20
# samples/wk. = 5

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

9

Copper (dissolved)

4/25/2012 12:19:21 PM

Facility = Lawrenceville WWTP
Chemical = Copper (µg/L)
Chronic averaging period = 4
WLAa = 6.4
WLAc = 4.8
Q.L. = 0.5
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 3
Expected Value = 1.65
Variance = .9801
C.V. = 0.6
97th percentile daily values = 4.01513
97th percentile 4 day average = 2.74525
97th percentile 30 day average= 1.98998
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

1.88
1.4
1.67

Lead (total recoverable)

4/25/2012 12:36:45 PM

Facility = Lawrenceville WWTP
Chemical = Lead (µg/L)
Chronic averaging period = 4
WLAa = 40
WLAc = 4.7
Q.L. = .1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = .56
Variance = .112896
C.V. = 0.6
97th percentile daily values = 1.36271
97th percentile 4 day average = .931722
97th percentile 30 day average= .675389
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

0.56

4/25/2012 12:20:50 PM

Facility = Lawrenceville WWTP
Chemical = Nickel (µg/L)
Chronic averaging period = 4
WLAa = 96
WLAc = 11
Q.L. = 0.5
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 3
Expected Value = .744178
Variance = .199368
C.V. = 0.6
97th percentile daily values = 1.81089
97th percentile 4 day average = 1.23815
97th percentile 30 day average= .897518
< Q.L. = 1
Model used = BPJ Assumptions, Type 1 data

No Limit is required for this material

The data are:

0.74
0
0.5

4/27/2012 9:45:15 AM

Facility = Lawrenceville WWTP
Chemical = Zinc (µg/L)
Chronic averaging period = 4
WLAa = 61
WLAc = 64
Q.L. = 2.0
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 3
Expected Value = 28.3666
Variance = 289.680
C.V. = 0.6
97th percentile daily values = 69.0279
97th percentile 4 day average = 47.1961
97th percentile 30 day average= 34.2117
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 61
Average Weekly limit = 61
Average Monthly LImit = 61

The data are:

23.8
30.2
31.1

Attachment H

Whole Effluent Toxicity Data and Limitation Evaluation

Lawrenceville WWTP (VA0020354): WET Testing/Monitoring Results - 2012 Permit

Vertebrate Test Results

Place an 'X' beside WET testing requirements under which the data were reported. List data in the appropriate test method columns. Only one species for each Acute and Chronic test may be entered.

Acute		Chronic	
48-Hour Static Acute Tests:		**Chronic 7-Day Survival and Growth Test with *Pimephales promelas***	x
Pimephales promelas	X		
Oncorhynchus mykiss			
Cyprinodon variegatus			
96-Hour Static Renewal Tests:		**Chronic 7-Day Survival and Growth Test with *Cyprinodon variegatus***	
Pimephales promelas			
Oncorhynchus mykiss			
Cyprinodon variegatus			

Invertebrate Test Results

Place an 'X' beside WET testing requirements under which the data were reported. List data in the appropriate test method columns. Only one species for each Acute and Chronic testmay be entered.

Acute		Chronic	
48-Hour Static Acute Tests:		**Chronic 3-Brood Survival and Reproduction Test with *Ceriodaphnia dubia***	X
Ceriodaphnia dubia	X		
Americamysis bahia		**Chronic 3-Brood Survival, Reproduction and Fecundity Test with *Americamysis bahia***	

		48-Hour Static Acute *(Pimephales promelas)*			**Chronic 7-Day Survival and Growth *(Pimephales promelas)***						**48-Hour Static Acute *(Ceriodaphnia dubia)***			**Chronic 3-Brood Survival and Reproduction *(Ceriodaphnia dubia)***					
		Acute Test Results			**Chronic Test Results**						**Acute Test Results**			**Chronic Test Results**					
	Laboratory Report Date	NOAEC (%)	LC50 (%)	TUa	NOEC (%) Survival	NOEC (%) Reproduction	NOEC (%) Growth	TUc	IC25	LC50	NOAEC (%)	LC50 (%)	TUa	NOEC (%) Survival	NOEC (%) Reproduction	NOEC (%) Growth	TUc	IC25	LC50
1997 Permit Cycle	8/8/1999	100			100		100				90			100		100			
	12/9/1999	100			100		21.25				95								
	1/5/2000				85		85							100		100			
	2/29/2000	100			100		100				85			100		100			
	6/2/2000	100			100		100				100			100		100			
	10/31/2000	100			100		42.5												
	12/4/2000													100		100			
2002 Permit Cycle	10/31/2002	100			100		29				80			100		100			
	11/25/2002				100		100												
	11/14/2003	100			100		100				85			100		100			
	10/28/2004	100			14.5						95			100		100			
	11/19/2004				100		100												
	11/4/2005	100			100		100				100			100		100			
	11/21/2006	100			100		100				100			100		100			
2007 Permit Cycle	9/5/2008													100		100	1.00		
	8/20/2009													100	100		1.00	>100	>100
	8/12/2010													100	100		1.00	92.5	>100
	8/22/2011													100	<33		3.03	12.9	>100
	12/13/2011				100		100	1.00		>100									
	3/14/2012				100		100												

Spreadsheet for determination of WET test endpoints or WET limits

Excel 97
Revision Date: 01/10/05
File: WETLIM10.xls
(MIX.EXE required also)

Acute Endpoint/Permit Limit — **Use as LC_{50} in Special Condition, as TUa on DMR**

ACUTE	100% =	NOAEC	LC_{50} =	NA	% Use as	NA	TUa

ACUTE WLAa 0.37925

Note: Inform the permittee that if the mean of the data exceeds this TUa: 1.0 a limit may result using WLA.EXE

Chronic Endpoint/Permit Limit — **Use as NOEC in Special Condition, as TUc on DMR**

CHRONIC	1.98705243	TU_c	NOEC =	51	% Use as	1.96	TU_c
BOTH*	3.7925	TU_c	NOEC =	27	% Use as	3.70	TU_c
AML	1.98705243	TU_c	NOEC =	51	% Use as	1.96	TU_c

Enter data in the cells with blue type:

Entry Date:	05/11/12						
Facility Name:	Lawrenceville						
VPDES Number:	VA0020354						
Outfall Number:	1						
Plant Flow:	1.2	MGD					
Acute 1Q10:	0.317	MGD					
Chronic 7Q10:	0.372	MGD					

ACUTE WLAa,c 3.7925
CHRONIC WLAc 1.31
* Both means acute expressed as chronic

Note: Inform the permittee that if the mean of the data exceeds this TUc: 1.0 a limit may result using WLA.EXE

% Flow to be used from MIX.EXE

Acute	100	%					
Chronic	100	%					

Diffuser /modeling study?

Enter Y/N	N						
Acute	1	:1					
Chronic	1	:1					

Are data available to calculate CV? (Y/N)	Y	(Minimum of 10 data points, same species, needed)				Go to Page 2	
Are data available to calculate ACR? (Y/N)	N	(NOEC<LC50, do not use greater/less than data)				Go to Page 3	

NOTE: If the IWCa is >33%, specify the NOAEC = 100% test/endpoint for use

IWC_a	79.10349374	%	Plant flow/plant flow + 1Q10				
IWC_c	76.33587786	%	Plant flow/plant flow + 7Q10				
Dilution, acute	1.264166667		100/IWCa				
Dilution, chronic	1.31		100/IWCc				
WLA_a	0.37925	Instream criterion (0.3 TUa) X's Dilution, acute					
WLA_c	1.31	Instream criterion (1.0 TUc) X's Dilution, chronic					
$WLA_{a,c}$	3.7925	ACR X's WLA_a - converts acute WLA to chronic units					
ACR -acute/chronic ratio	10	LC50/NOEC (Default is 10 - if data are available, use tables Page 3)					
CV-Coefficient of variation	0.748302396	Default of 0.6 - if data are available, use tables Page 2)					
Constants eA	0.356303578	Default = 0.41					
eB	0.540453351	Default = 0.60					
eC	2.80659545	Default = 2.43					
eD	2.80659545	Default = 2.43 (1 samp)	No. of samples	1			

**The Maximum Daily Limit is calculated from the lowest LTA, X's eC. The LTAa,c and MDL using it are driven by the ACR.

$LTA_{a,c}$	1.351281318	WLAa,c X's eA							
LTA_c	0.70799389	WLAc X's eB					Rounded NOEC's		%
MDL** with $LTA_{a,c}$	3.7925	TU_c	NOEC =	26.367831	(Protects from acute/chronic toxicity)		NOEC =	27	%
MDL** with LTA_c	1.98705243	TU_c	NOEC =	50.325798	(Protects from chronic toxicity)		NOEC =	51	%
AML with lowest LTA	1.98705243	TU_c	NOEC =	50.325798	Lowest LTA X's eD		NOEC =	51	

IF ONLY ACUTE ENDPOINT/LIMIT IS NEEDED, CONVERT MDL FROM TU_c to TU_a

							Rounded LC50's		%
MDL with $LTA_{a,c}$	0.37925	TU_a	LC50 =	263.678312	%	Use NOAEC=100%	LC50 =	NA	%
MDL with LTA_c	0.198705243	TU_a	LC50 =	503.257984	%	Use NOAEC=100%	LC50 =	NA	

Page 2 - Follow the directions to develop a site specific CV (coefficient of variation)

IF YOU HAVE AT LEAST 10 DATA POINTS THAT ARE QUANTIFIABLE (NOT "<" OR ">") FOR A SPECIES, ENTER THE DATA IN EITHER COLUMN "G" (VERTEBRATE) OR COLUMN "J" (INVERTEBRATE). THE 'CV' WILL BE PICKED UP FOR THE CALCULATIONS BELOW. THE DEFAULT VALUES FOR eA, eB, AND eC WILL CHANGE IF THE 'CV' IS ANYTHING OTHER THAN 0.6.

Coefficient of Variation for effluent tests

CV = 0.748302396 (Default 0.6)

δ^2 = 0.444657921

δ = 0.666826755

Using the log variance to develop eA

(P. 100, step 2a of TSD)

Z = 1.881 (97% probability stat from table

A = -1.03197217

eA = 0.356303578

Using the log variance to develop eB

(P. 100, step 2b of TSD)

δ_4^2 = 0.131018718

δ_4 = 0.361965078

B = -0.61534695

eB = 0.540453351

Using the log variance to develop eC

(P. 100, step 4a of TSD)

δ^2 = 0.444657921

δ = 0.666826755

C = 1.031972165

eC = 2.80659545

Using the log variance to develop eD

(P. 100, step 4b of TSD)

n = 1 This number will most likely stay as "1", for 1 sample/month.

δ_n^2 = 0.444657921

δ_n = 0.666826755

D = 1.031972165

eD = 2.80659545

	Vertebrate IC_{25} Data or LC_{50} Data	LN of data		Invertebrate IC_{25} Data or LC_{50} Data	LN of data
	**********			**********	
1	1	0.000000	1		
2	4.705882	1.548813	2		
3	1.176471	0.162519	3		
4	1	0.000000	4		
5	1	0.000000	5		
6	2.352941	0.855666	6		
7	3.448276	1.237874	7		
8	1	0.000000	8		
9	1	0.000000	9		
10	6.896552	1.931022	10		
11	1	0.000000	11		
12	1	0.000000	12		
13	1	0.000000	13		
14	1	0.000000	14		
15	1	0.000000	15		
16			16		
17			17		
18			18		
19			19		
20			20		
St Dev	1.77409708	0.666826755	St Dev	NEED DATA	NEED DATA
Mean	1.90534147	0.382392967	Mean	0	0
Variance	3.14742043	0.444658	Variance	0	0.000000
CV	0.7483024		CV	0	

Page 3 - Follow directions to develop a site specific ACR (Acute to Chronic Ratio)

To determine Acute/Chronic Ratio (ACR), insert usable data below. Usable data is defined as valid paired test results, acute and chronic, tested at the same temperature, same species. The chronic NOEC must be less than the acute LC_{50}, since the ACR divides the LC_{50} by the NOEC. LC_{50}'s >100% should not be used.

Table 1. ACR using Vertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
				ACR for vertebrate data:			0

Table 1. Result:	Vertebrate ACR	0
Table 2. Result:	Invertebrate ACR	0
	Lowest ACR	Default to 10

Table 2. ACR using Invertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1		#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2		#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
				ACR for vertebrate data:			0

Table 3. Convert LC_{50}'s and NOEC's to Chronic TU's for use in WLA.EXE

ACR used: 10

	Enter LC_{50}	TUc	Enter NOEC	TUc
1		NO DATA	100	1.00
2		NO DATA	21.25	4.71
3		NO DATA	85	1.18
4		NO DATA	100	1.00
5		NO DATA	100	1.00
6		NO DATA	42.5	2.35
7		NO DATA	29	3.45
8		NO DATA	100	1.00
9		NO DATA	100	1.00
10		NO DATA	100	1.00
11		NO DATA	100	1.00
12		NO DATA	100	1.00
13		NO DATA	100	1.00
14		NO DATA	100	1.00
15		NO DATA		NO DATA
16		NO DATA		NO DATA
17		NO DATA		NO DATA
18		NO DATA		NO DATA
19		NO DATA		NO DATA
20		NO DATA		NO DATA

If WLA.EXE determines that an acute limit is needed, you need to convert the TUc answer you get to TUa and then an LC50,

enter it here: NO DATA %LC_{50}

NO DATA TUa

DILUTION SERIES TO RECOMMEND

Table 4.

	Monitoring % Effluent	Monitoring TUc	Limit % Effluent	Limit TUc
Dilution series based on data mean	100	1.0		
Dilution series to use for limit			51	1.9607843
Dilution factor to recommend:	0.5		0.7141428	
Dilution series to recommend:	100.0	1.00	100.0	1.00
	50.0	2.00	71.4	1.40
	25.0	4.00	51.0	1.96
	12.5	8.00	36.4	2.75
	6.25	16.00	26.0	3.84
Extra dilutions if needed	3.12	32.05	18.6	5.38
	1.56	64.10	13.3	7.54

5/8/2012 12:06:13 PM

Facility = Lawrenceville WWTP
Chemical = WET - P.promelas Chronic Test
Chronic averaging period = 4
WLAa = 3.7925
WLAc = 1.31
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 14
Expected Value = 1.51080
Variance = .741450
C.V. = 0.569943
97th percentile daily values = 3.55949
97th percentile 4 day average = 2.45765
97th percentile 30 day average= 1.80651
< Q.L. = 0
Model used = lognormal

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 1.89731290451866
Average Weekly limit = 1.89731290451866
Average Monthly LImit = 1.89731290451866

The data are:

1
4.71
1.18
1
1
2.35
3.45
1
1
1
1
1
1
1

Kazio, Jeremy (DEQ)

From: DeBiasi, Deborah (DEQ)
Sent: Thursday, May 10, 2012 5:29 PM
To: Kazio, Jeremy (DEQ)
Subject: RE:

I spoke with Robbie Williams and had him explain what they did with sample bottles, and while what they are doing is working (ala HRSD), I suggested a couple of things they could do themselves that would save them money:

- They maintain their sample device jugs – clean with soap and water, and have a spare or two so the washed one would dry inbetween uses. They could buy the Tygon tubing and reload the samplers themselves too. Glass jugs would be best and easiest to clean, but subject to breakage, so they'd need some spares. He wasn't sure they could do that so they will probably stick with HRSD.
- I even suggested that they use a wage person to drive the samples to CBI – 2.5 hours from Lawrenceville – but Robbie thought they might get lost.

He's very nice and conscientious but will probably stick with what he's doing since he doesn't thing the "town" managers will buy off on changes. I told him I'd be glad to talk to them if it would help.

As for permitting, just put the limit in with the *P. promelas* and we'll disregard the *C. dubia* test as not representative of their effluent. I'll be here tomorrow if you have questions.

Deborah L. DeBiasi, Virginia DEQ
Office of Water Permit and Compliance Assistance Programs
Email: Deborah.DeBiasi@deq.virginia.gov
PH: 804-698-4028

From: Kazio, Jeremy (DEQ)
Sent: Thursday, May 10, 2012 12:27 PM
To: DeBiasi, Deborah (DEQ)
Subject:

Jeremy S. Kazio
Water Permit Writer
DEQ Piedmont Regional Office
4949-A Cox Road
Glen Allen, VA 23060
Tel: (804) 527-5044

Kazio, Jeremy (DEQ)

From: DeBiasi, Deborah (DEQ)
Sent: Thursday, May 31, 2012 3:24 PM
To: Kazio, Jeremy (DEQ)
Subject: RE: VA0020354 Lawrenceville WWTP - WET Limitation and Monitoring Requirements

Thanks for the reminder – email does get buried here. I made some edits on your permit language, so let me know if you have any questions or comments about it.

Deb

Deborah L. DeBiasi, Virginia DEQ
Office of Water Permit and Compliance Assistance Programs
Email: Deborah.DeBiasi@deq.virginia.gov
PH: 804-698-4028

From: Kazio, Jeremy (DEQ)
Sent: Thursday, May 31, 2012 11:47 AM
To: DeBiasi, Deborah (DEQ)
Subject: FW: VA0020354 Lawrenceville WWTP - WET Limitation and Monitoring Requirements

Deborah,

Have you gotten a chance to take a look at this yet? I'm not trying to be pushy, just wanted to make sure you hadn't forgotten. Thanks so much!!

From: Kazio, Jeremy (DEQ)
Sent: Friday, May 11, 2012 9:17 AM
To: DeBiasi, Deborah (DEQ)
Subject: VA0020354 Lawrenceville WWTP - WET Limitation and Monitoring Requirements

Deborah,

This email is to obtain your recommendations and/or concurrence on the WET evaluation, limitation, and proposed language for the draft 2012 permit for the subject facility.

The Town of Lawrenceville Wastewater Treatment Plant (Lawrenceville WWTP) is a publicly owned municipal treatment works with a design flow of 1.2 MGD. The treatment works serves the Town of Lawrenceville, the nearby Brunswick Jail, and will serve the proposed Meherrin Regional Jail, and does not have any significant industrial users (an industrial user survey requirement is included with the draft permit). The treatment process consists of influent screening, grit removal, primary settling, oxidation ditches, clarification, ultraviolet disinfection, and step aeration. The 2012 permit proposed limitations and monitoring requirements are as follows:

EFFLUENT CHARACTERISTICS		DISCHARGE LIMITATIONS					
		MONTHLY AVERAGE		WEEKLY AVERAGE		MINIMUM	MAXIMUM
Flow (MGD) [a]		NL		NA		NA	NL
pH		NA		NA		6.0 SU	9.0 SU
$cBOD_5$ [b]	Jan - Apr	20 mg/L	91 kg/d	30 mg/L	140 kg/d	NA	NA
	May - Dec	10 mg/L	45 kg/d	15 mg/L	68 kg/d	NA	NA
Total Suspended Solids (TSS) [b]		20 mg/L	91 kg/d	30 mg/L	140 kg/d	NA	NA
Ammonia as N	Jan - Apr	13.5 mg/L		13.5 mg/L		NA	NA
Total Kjeldahl Nitrogen (TKN)	May - Dec	3.0 mg/L	14 kg/d	4.5 mg/L	20 kg/d	NA	NA
Dissolved Oxygen (DO)	Jan - Apr	NA		NA		5.0 mg/L	NA
	May - Dec	NA		NA		6.5 mg/L	NA
E.coli		126 N / 100 mL (Geometric Mean)		NA		NA	NL
Zinc, Total Recoverable		61 µg/L		61 µg/L		NA	NA
Chronic 7-Day Static Renewal Survival and Growth Test: [*Pimephales promelas*] [c]		NA		NA		NA	TUc = 1.9

Attached to this email is a summary of the WET testing results submitted to DEQ between 1999-2012. Also included in the same Excel workbook are the WETLIM results for each species that were evaluated (chronic tests were chosen). As we discussed earlier, the limitation for P.promelas will remain the same as the 2007 limitation, and was chosen because historical data indicates that it is the most sensitive species.

Below is the proposed 2012 draft permit language for WET testing. Please feel free to edit the language in any way you see fit. Thank you!!

B. Whole Effluent Toxicity (WET) Testing

1. The Whole Effluent Toxicity limitation of ≤1.9 TU_c (NOEC ≥ 53%) in Part I.A. is a final limit that is effective with the date of permit issuance. ~~with an effective date beginning with the effective date of the permit.~~

2. Commencing no later than one (1) month (Consider making this within 3 months to allow time for the lab to have the organisms and be ready to test) following the effective date of the permit, the permittee shall conduct quarterly chronic toxicity tests using 24-hour flow-proportioned composite samples of final effluent from Outfall 001 in accordance with the limitation and monitoring frequency in Part I.A.1 and Part I.A.5 of this permit. The chronic test~~s~~ to use is ~~are~~:

   Chronic 7-Day Survival and Growth Static Renewal Test using *Pimephales promelas*

   These chronic tests shall be conducted in such a manner and at sufficient dilutions (minimum of five dilutions, derived geometrically) to determine the "No Observed Effect Concentration" (NOEC) for survival and ~~reproduction or~~ growth. Results which cannot be quantified (i.e. a "less than" NOEC value) are not acceptable, and a retest will have to be performed. A retest of a non-acceptable test must be performed during the same compliance period as the test it is replacing. Express the test NOEC as TUc (Chronic Toxicity Units), by dividing 100/NOEC for DMR reporting. Report the LC50 at 48 hours and the IC25 with the NOEC's in the test report.

3. The permit may be modified or revoked and reissued to include pollutant specific limits in lieu of a WET limit should it be demonstrated that toxicity is due to specific parameters. The pollutant specific limits must control the toxicity of the effluent.

4. Reporting Schedule

The permittee shall submit the toxicity test results ~~with the DMR~~ to the DEQ Piedmont Regional Office for the tests specified no later than the 10th of the month immediately following each calendar quarter in which a toxicity test was performed.

Attachment I

No Exposure Certification Information

VIRGINIA DEQ NO EXPOSURE CERTIFICATION
FOR EXCLUSION FROM VPDES STORM WATER PERMITTING

Submission of this **No Exposure Certification** constitutes notice that the entity identified below does not require permit authorization for its storm water discharges associated with industrial activity under the VPDES Permit Program due to the existence of a condition of **No Exposure**.

A condition of **No Exposure** exists at an industrial facility when all industrial materials and activities are protected by a storm resistant shelter to prevent exposure to rain, snow, snowmelt, and/or runoff. Industrial materials or activities include, but are not limited to, material handling equipment or activities, industrial machinery, raw materials, intermediate products, by-products, final products, or waste products. Material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product or waste product. A storm resistant shelter is not required for the following industrial materials and activities:

- drums, barrels, tanks, and similar containers that are tightly sealed, provided those containers are not deteriorated and do not leak. "Sealed" means banded or otherwise secured and without operational taps or valves;
- adequately maintained vehicles used in material handling; and
- final products, other than products that would be mobilized in storm water discharges (e.g., rock salt).

A No Exposure Certification must be provided for each facility qualifying for the No Exposure exclusion. In addition, the exclusion from VPDES permitting is available on a facility-wide basis only, not for individual outfalls. If any industrial activities or materials are or will be exposed to precipitation, the facility is not eligible for the No Exposure exclusion.

By signing and submitting this No Exposure Certification form, the entity below is certifying that a condition of No Exposure exists at its facility or site, and is obligated to comply with the terms and conditions at 9 VAC 25-31-120 E (the VPDES Permit Regulation).

Please Type or Print All Information. ALL INFORMATION ON THIS FORM MUST BE PROVIDED.

1. Facility Operator Information

Name: Town of Lawrenceville

Mailing Address: 400 North Main Street

City: Lawrenceville State: Va Zip: 23868 Phone: 434-848-2414

2. Facility/Site Location Information

Facility Name: Town of Lawrenceville WWTP

Address: 380 Meadow Lane

City: Lawrenceville State: VA Zip: 23868

County Name: Brunswick

Latitude: 36°44'49.80" N Longitude: 77°50'16.77" W

3. Was the facility or site previously covered under a VPDES storm water permit? Yes ☐ No ☒

If "Yes", enter the VPDES permit number: _____

4. SIC/Activity Codes: Primary: 4952 Secondary (if applicable): _____

5. Total size of facility/site associated with industrial activity: 28.2 acres

6. Have you paved or roofed over a formerly exposed pervious area in order to qualify for the No Exposure exclusion? Yes ☐ No ☒

If "Yes", please indicate approximately how much area was paved or roofed. Completing this question does not disqualify you for the No Exposure exclusion. However, DEQ may use this information in considering whether storm water discharges from your site are likely to have an adverse impact on water quality, in which case you could be required to obtain permit coverage.

Less than one acre ☐ One to five acres ☐ More than five acres ☐

7. Exposure Checklist

Are any of the following materials or activities exposed to precipitation, now or in the foreseeable future? (Please check either "Yes" or "No" in the appropriate box.) **If you answer "Yes" to any of these questions (1) through (11), you are <u>not</u> eligible for the No Exposure exclusion.**

	Yes	No
(1) Using, storing or cleaning industrial machinery or equipment, and areas where residuals from using, storing or cleaning industrial machinery or equipment remain and are exposed to storm water	☐	☒
(2) Materials or residuals on the ground or in storm water inlets from spill/leaks	☐	☒
(3) Materials or products from past industrial activity	☐	☒
(4) Material handling equipment (except adequately maintained vehicles)	☐	☒
(5) Materials or products during loading/unloading or transporting activities	☐	☒
(6) Materials or products stored outdoors (except final products intended for outside use [e.g., new cars] where exposure to storm water does not result in the discharge of pollutants)	☐	☒
(7) Materials contained in open, deteriorated or leaking storage drums, barrels, tanks, and similar containers	☐	☒
(8) Materials or products handled/stored on roads or railways owned or maintained by the discharger	☐	☒
(9) Waste material (except waste in covered, non-leaking containers [e.g., dumpsters])	☐	☒
(10) Application or disposal of process wastewater (unless otherwise permitted)	☐	☒
(11) Particulate matter or visible deposits of residuals from roof stacks and/or vents not otherwise regulated (i.e., under an air quality control permit) and evident in the storm water outflow	☐	☒

8. Certification Statement

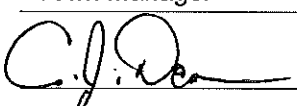
I certify under penalty of law that I have read and understand the eligibility requirements for claiming a condition of no exposure and obtaining an exclusion from VPDES storm water permitting; and that there are no discharges of storm water contaminated by exposure to industrial activities or materials from the industrial facility identified in this document (except as allowed under 9 VAC 25-31-120 E 2).

I understand that I am obligated to submit a No Exposure Certification form once every five years to the Department of Environmental Quality and, if requested, to the operator of the local MS4 into which this facility discharges (where applicable). I understand that I must allow the Department, or MS4 operator where the discharge is into the local MS4, to perform inspections to confirm the condition of no exposure and to make such inspection reports publicly available upon request. I understand that I must obtain coverage under a VPDES permit prior to any point source discharge of storm water associated with industrial activity from the facility.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly involved in gathering the information, the information submitted is to the best of my knowledge and belief true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Print Name: C. J. Dean

Print Title: Town Manager

Signature: 

Date: May 3, 2012

For Department of Environmental Quality Use Only

(Accepted) / Not Accepted by: Jeremy Kazio, Water Permit Writer Date: May 14, 2012

Jeremy,

On May 9, 2011 I inspected the Lawrenceville WWTP - located at 380 Meadow Lane, Lawrenceville, VA 23868 - for No Exposure Certification. This is a 1.2 mgd wastewater treatment plant for the Town of Lawrenceville. I walked the site with Robert Williams, Jr., Chief Operator. Grit and screenings are discharged to a small dumpster located at the headworks; any spillage is to a concrete pad with an area drain that is tied into the treatment plant. Used oil from the various pieces of equipment is picked up periodically for recycle. Drums of polymer are stored under roof in the bio-solids truck loading area. The septage receiving station is maintained in an orderly manner; any spillage is to a concrete pad with an area drain that is tied into the treatment plant. The emergency diesel generator has a self contained fuel tank. **No Exposure Certification is recommended.**

Dumpster at headworks. Any spillage is to a concrete pad with an area drain (arrow) tied into the treatment plant.

Drums of polymer are stored under roof

.

Septage receiving station. Any spillage is to a concrete pad with an area drain (arrow) tied into the treatment plant.

The emergency diesel generator has a self contained fuel tank.

Mike Dare
Environmental Inspector
Virginia Department of Environmental Quality
Piedmont Regional Office
4949-A Cox Road
Glen Allen, VA 23060
Phone: 804-527-5055

Attachment J

VDH-ODW Concurrence and T&E Coordination

MEMORANDUM

DATE: April 27, 2012

TO: Jeremy S. Kazio, Water Permit Writer
DEQ Piedmont Regional Office
4949-A Cox Road
Glen Allen, VA 23060

FROM: Mitchell R. Childrey, P.E., Engineering Field Director
VDH-ODW-Danville Field Office

M R Childrey

CITY/COUNTY: Brunswick County (Town of Lawrenceville)

SUBJECT:
- ☒ VPDES Application No. 0020354 ☒ Existing ☐ Proposed
- ☐ VWP Permit No. _____ ☐ Existing ☐ Proposed
- ☐ Other: _____

OWNER/APPLICANT: Town of Lawrenceville

LOCATION OF DISCHARGE/ACTIVITY: N 36°44'37" ; W 77°50'10"

☒ There are no public water supply raw water intakes within 15 miles downstream of the discharge.

☐ The raw water intake for _____ waterworks is located _____ miles downstream from the discharge. We recommend a minimum Reliability Class _____ for this facility [which is] [the same as the existing Reliability Class] [more stringent than the existing Reliability Class].

☐ The raw water intake for _____ waterworks is located _____ miles downstream from the discharge.

☐ Please forward a copy of the Draft Permit for our review and comment.

☐ Other Comments: _____

_____

Reviewer: Bryan M. Simmons 4-27-12

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

VPDES PERMITS

Threatened and Endangered Species Coordination

To:

- ☒ DGIF, Environmental Review Coordinator
- ☐ DCR
- ☐ USFWS, T/E Review Coordinator

From: Jeremy Kazio, Permit Writer

Date Sent: 4/20/2012

Permit Number: VA0020354

Facility Name: Lawrenceville Wastewater Treatment Plant (WWTP)

Contact: C.J. Dean, Town Manager (Lawrenceville)

Phone: (434) 848-2414

Address: 400 N.Main St., Lawrenceville VA 23868

Location: 36.7474580°N / -77.8364597°W

USGS Quadrangle: Powelton (9A)

Latitude/Longitude: See above

Receiving Stream: Roses Creek

Receiving Stream Flow Statistics used for Permit:

1Q10 (Annual) =	0.317	MGD
7Q10 (Annual) =	0.372	MGD
30Q10 (Annual) =	0.626	MGD
1Q10 (Wet season) =	2.62	MGD
30Q10 (Wet season) =	5.17	MGD
30Q5 =	0.973	MGD
Harmonic Mean =	3.88	MGD

Effluent Characteristics and Max Daily Flow:
Design Flow = 1.2 MGD
Average Flow 2011-2012 = 0.80 MGD

Species Search Results (or attach database report and map):

DGIF Online Report.pdf

Threatened Species.pdf

Attach draft permit effluent limits page if available.
DGIF email: projectreview@dgif.virginia.gov
USF&W fax: (804)693-9032

Virginia Department of Game and Inland Fisheries

4/20/2012 1:45:12 PM

Fish and Wildlife Information Service

VaFWIS Search Report Compiled on 4/20/2012, 1:45:12 PM

Help

Known or likely to occur within a **2 mile radius around point 36.7474580 -77.8364597**
in **025 Brunswick County, VA**
where (060173) **Pigtoe, Atlantic** observed.

View Map of Site Location

Bat Colonies or Hibernacula: **Not Known**

Threatened and Endangered Waters where Pigtoe, Atlantic (060173) observed

(1 Reach)

View Map of All Threatened and Endangered Waters

Stream Name	T&E Waters Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
Meherrin River (03010204)	FSST	060081	ST	II	Floater, green	Lasmigona subviridis	Yes
		060173	FSST	II	Pigtoe, Atlantic	Fusconaia masoni	

* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FC=Federal Candidate; FS=Federal Species of Concern; CC=Collection Concern

** I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Habitat Predicted for Aquatic WAP Tier I & II Species where Pigtoe, Atlantic (060173) observed

(3 Reaches)

View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species

Stream Name	Tier Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
Great Creek (03010204)	FSST	060081	ST	II	Floater, green	Lasmigona subviridis	Yes
		060173	FSST	II	Pigtoe, Atlantic	Fusconaia masoni	

Great Creek (03010204)	FSST	060173	FSST	II	Pigtoe, Atlantic	Fusconaia masoni	Yes
Meherrin River (03010204)	FSST	010174		II	Bass, Roanoke	Ambloplites cavifrons	Yes
		060081	ST	II	Floater, green	Lasmigona subviridis	
		060173	FSST	II	Pigtoe, Atlantic	Fusconaia masoni	

Habitat Predicted for Terrestrial WAP Tier I & II Species where Pigtoe, Atlantic (060173) observed

N/A

USGS National 6th Order Watersheds Summary of Wildlife Action Plan Tier I, II, III, and IV Species:

HU6 Code	USGS 6th Order Hydrologic Unit	Different Species	Highest TE	Highest Tier
CM14	Meherrin River-Allen Creek	51	FSST	I
CM16	Great Creek	51	FSST	I

Compiled on 4/20/2012, 1:45:12 PM I390657.2 report=BOVA searchType= R dist= 3218 poi= 36.7474580 -77.8364597

audit no. 390657 4/20/2012 1:45:12 PM Virginia Fish and Wildlife Information Service

Kazio, Jeremy (DEQ)

From: ProjectReview (DGIF)
Sent: Tuesday, June 05, 2012 3:18 PM
To: Kazio, Jeremy (DEQ); nhreview (DCR)
Cc: ProjectReview (DGIF); Cason, Gladys (DGIF)
Subject: ESSLog 32867; DEQ VPDES re-issuance VA 0020354; Lawrenceville WWTP in Lawrenceville , Virginia

We have reviewed the above-referenced VPDES permit re-issuance. According to the application, the receiving stream is Roses Creek (with a 7Q10 of 0.372 million gallons per day) a headwater tributary to the Meherrin River. The Design flow for this facility is 1.2 Million Gallons per Day (MGD). The facility uses ultraviolet (UV) disinfection.

According to our records, the state Threatened (ST) green floater and ST Atlantic pigtoe are known from the Meherrin River, a designated Threatened and Endangered (T&E) species waters for these species.

We recommend and support ultraviolet (UV) disinfection rather than chlorination. The ammonia limits proposed within the EPA rule are expressed on the basis of total ammonia-nitrogen (TAN). The proposed EPA ammonia limit for waters with mussels (not T&E mussels, any mussel species) is:

- CMC (Criterion Maximum Concentration or acute) - 2.9 mg N/L (at pH 8 and 25C)
- CCC (Criterion Continuous Concentration or chronic) - 0.26 mg N//L (at pH 8 and 25C) with a 4-day average within the 30 day average period no higher than 2.5 the CCC, which would be 0.65 mg N/L.

The ammonia limits proposed within the EPA rule are the best information currently available regarding ammonia levels protective of mussels. Therefore, we recommend the EPA values be implemented in this permit for this and all future VPDES permits.

This project is located within 2 miles of a documented occurrence of a state or federal threatened or endangered plant or insect species and/or other Natural Heritage coordination species. Therefore, we recommend coordination with VDCR-DNH regarding the protection of these resources. We also recommend contacting the USFWS regarding all federally listed species.

Provided the applicant adheres to the effluent characteristics identified in the permit application, we do not anticipate the re-issuance of this permit to result in adverse impact to designated T&E species waters or their associated species. Thank you for the opportunity to provide comments.

Ernie Aschenbach
Environmental Services Biologist
Virginia Dept. of Game and Inland Fisheries
P.O. Box 11104
4010 West Broad Street
Richmond, VA 23230
Phone: (804) 367-2733
FAX: (804) 367-2427
Email: Ernie.Aschenbach@dgif.virginia.gov

Kazio, Jeremy (DEQ)

From: Susan_Lingenfelser@fws.gov
Sent: Thursday, June 28, 2012 1:14 PM
To: Kazio, Jeremy (DEQ)
Subject: Re: FW: ESSLog 32867; DEQ VPDES re-issuance VA 0020354; Lawrenceville WWTP in Lawrenceville , Virginia
Attachments: pic23646.gif

Jeremy,

I have reviewed the referenced project. The following comments are provided under provisions of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended. Based on the project location, it appears that there are not federally listed species or designated critical habitat in the area and therefore no impacts to federally listed species are anticipated. Should project plans change or if additional information on the distribution of listed species or critical habitat becomes available, this determination may be reconsidered. If you have any questions, please contact me at (804) 693-6694, extension 151, or via email.

Susan

****

Susan Lingenfelser, Ph.D.
U.S. Fish and Wildlife Service
6669 Short Lane
Gloucester, VA 23061

tel: 804-824-9720 or 804-824-9740 x151
fax: 804-693-9032

****

"Kazio, Jeremy (DEQ)" <Jeremy.Kazio@deq.virginia.gov>

"Kazio, Jeremy (DEQ)" <Jeremy.Kazio@deq.virginia.gov>

06/06/2012 11:59 AM

To"Susan_Lingenfelser@fws.gov" <Susan_Lingenfelser@fws.gov>

cc

SubjectFW: ESSLog 32867; DEQ VPDES re-issuance VA 0020354; Lawrenceville WWTP in Lawrenceville , Virginia

Dr. Lingenfelser,

The Virginia Department of Game and Inland Fisheries (VA DGIF) has suggested that I coordinate with your agency regarding the reissuance of VPDES Permit No. VA0020354, Town of Lawrenceville Wastewater Treatment Plant (see forwarded email below). The VA DGIF website T&E survey found two species within two miles of the discharge. One of these species, the Atlantic pigtoe, is considered to be a Federal Species of Concern.

I haven't had the opportunity to coordinate with your agency before, so I'm not sure what information you need in order to conduct a review of this project. Please let me know at your earliest convenience. This permit expires on September 10, 2012 and is currently in draft form.

Thank you.

Jeremy S. Kazio
Water Permit Writer
DEQ Piedmont Regional Office
4949-A Cox Road
Glen Allen, VA 23060
Tel: (804) 527-5044

DEQ Website | Piedmont Regional Office

From: ProjectReview (DGIF)
Sent: Tuesday, June 05, 2012 3:18 PM
To: Kazio, Jeremy (DEQ); nhreview (DCR)
Cc: ProjectReview (DGIF); Cason, Gladys (DGIF)
Subject: ESSLog 32867; DEQ VPDES re-issuance VA 0020354; Lawrenceville WWTP in Lawrenceville , Virginia

We have reviewed the above-referenced VPDES permit re-issuance. According to the application, the receiving stream is Roses Creek (with a 7Q10 of 0.372 million gallons per day) a headwater tributary to the Meherrin River. The Design flow for this facility is 1.2 Million Gallons per Day (MGD). The facility uses ultraviolet (UV) disinfection.

According to our records, the state Threatened (ST) green floater and ST Atlantic pigtoe are known from the Meherrin River, a designated Threatened and Endangered (T&E) species waters for these species.

We recommend and support ultraviolet (UV) disinfection rather than chlorination. The ammonia limits proposed within the EPA rule are expressed on the basis of total ammonia-nitrogen (TAN). The proposed EPA ammonia limit for waters with mussels (not T&E mussels, any mussel species) is:

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The ammonia limits proposed within the EPA rule are the best information currently available regarding ammonia levels protective of mussels. Therefore, we recommend the EPA values be implemented in this permit for this and all future VPDES permits.

This project is located within 2 miles of a documented occurrence of a state or federal threatened or endangered plant or insect species and/or other Natural Heritage coordination species. Therefore, we recommend coordination with VDCR-DNH regarding the protection of these resources. We also

recommend contacting the USFWS regarding all federally listed species.

Provided the applicant adheres to the effluent characteristics identified in the permit application, we do not anticipate the re-issuance of this permit to result in adverse impact to designated T&E species waters or their associated species. Thank you for the opportunity to provide comments.

Ernie Aschenbach
Environmental Services Biologist
Virginia Dept. of Game and Inland Fisheries
P.O. Box 11104
4010 West Broad Street
Richmond, VA 23230
Phone: (804) 367-2733
FAX: (804) 367-2427
Email: Ernie.Aschenbach@dgif.virginia.gov

Attachment K

2012 Application Waiver Requests and DEQ Approvals

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January 24, 2012

Mr. Curt Linderman
Piedmont Regional Office
4949-A Cox Road
Glen Allen, VA 23060

Ref: permit renewal for Lawrenceville # VA0020354

Dear Mr. Linderman:

The Town of Lawrenceville is in the process of completing the required testing for the permit renewal, Section 2A. The appendix A- Guidance for Completing the Effluent Testing Information; All Treatment Works specifies that samples must be representative and taken no fewer than four months apart and more than eight months apart.

The Town of Lawrenceville will conduct three rounds of testing, however, we are requesting a variance to the rules and request a waiver of the eight month maximum span between the samples. Lawrenceville had Hampton Roads Sanitation District conduct the first round of testing for the permit renewal on September 1, 2010. The second and third sample rounds were not taken due to a snafu in the sampling arrangement, but are now scheduled. Both additional rounds of testing will be conducted prior to the permit renewal deadline. This will give the data that shows seasonal variance in the Lawrenceville Plant performance. Since September 2010, the Lawrenceville treatment plant, a 1.2 MGD treatment plant has experienced average flows of less than 0.760 MGD, and has had no operational changes and no changes within the customer base that would affect the influent stream.

Please let me know when or if this waiver could be granted so that we can proceed with the scheduled sampling in order for the permit to be submitted on time, March 10, 2012.

Thank you in advance for your help in this matter,

C J Dean

cc:Jeremy Kazio, DEQ
Robert Williams, Lawrenceville
Danny Barker, HRSD

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office

4949-A Cox Road **Glen Allen, VA 23060** **804/527-5020**

SUBJECT: Waiver Request for VA0020354 – Town of Lawrenceville Wastewater Treatment Plant

TO: Curtis J. Linderman – Water Permit Manager

FROM: Jeremy Kazio – Water Permit Writer

DATE: January 30, 2012

COPIES: EPA/Region III; File

PERMIT EXPIRATION DATE: **September 10, 2012**

PERMIT APPLICATION DUE DATE: **March 14, 2012**

The Town of Lawrenceville Wastewater Treatment Plant (Lawrenceville WWTP) is a publicly owned municipal treatment works with a design flow of 1.2 MGD. The treatment works serves the Town of Lawrenceville, the nearby Brunswick Jail, and will serve the proposed Meherrin Regional Jail, and does not have any industrial users. The treatment process consists of influent screening, grit removal, primary settling, oxidation ditches, clarification, ultraviolet disinfection, and step aeration. The 2007 permit limitations are as follows:

EFFLUENT CHARACTERISTICS		DISCHARGE LIMITATIONS						MONITORING	
		MONTHLY AVERAGE		WEEKLY AVERAGE		MINIMUM	MAXIMUM	FREQ.	SAMPLE TYPE
Flow (MGD)		NL		NA		NA	NL	Continuous	Totalizing, Indicating and Recording
pH (standard units)		NA		NA		6.0	9.0	1/Day	Grab
$cBOD_5$	Jan.-Apr.	20 mg/L	90 kg/d	30 mg/L	140 kg/d	NA	NA	1/Week	24 HC
	May-Dec.	10 mg/L	45 kg/d	15 mg/L	68 kg/d				
Total Suspended Solids (TSS)		20 mg/L	90 kg/d	30 mg/L	140 kg/d	NA	NA	1/Month	24 HC
Ammonia	Jan.- Apr.	13.5 mg/L		NA		NA	13.5 mg/L	1/Month	Grab
Total Kjeldahl Nitrogen (TKN)	May-Dec.	3.0 mg/L	14 kg/d	4.5 mg/L	20 kg/d	NA	NA	3D/Week	24 HC
Dissolved Oxygen	Jan.-Apr	NA		NA		5.0 mg/L	NA	1/Day	Grab
	May-Dec.					6.5 mg/L			
Fecal Coliform (Colonies /100 mL)		200 N Geometric Mean		200 N Geometric Mean		NA	NA	5D/Week 10 a.m.- 4 p.m.	Grab
Total Recoverable Zinc		0.075 mg/L		0.075 mg/L		NA	NA	1/ Six Months	Grab
TU_c – Chronic 7-Day Static Renewal Survival		NA		NA		NA	TU_c=1.9	1/ Three Months	24HC

The attached waiver request letter from C.J. Dean, Town Manager of the Town of Lawrenceville, was received by the Department of Environmental Quality-Piedmont Regional Office (DEQ-PRO) on January 25, 2012. The permittee has requested to be granted a waiver from the eight (8) month maximum time span between any two of three required sampling events applied to Section D of EPA Application Form 2A. According to Appendix A of the Form 2A Instructions (pg. 13), ". . . At least two of the samples used to complete the effluent testing information questions must have been taken no fewer than 4 months and no more than 8 months apart."

The Town of Lawrenceville hired the Hampton Roads Sanitation District (HRSD) to conduct all of the sampling necessary to complete Form 2A. The HRSD conducted the first sampling event on September 1, 2010, but did not conduct the subsequent second and third sampling events within the allotted time span noted above. Upon completing the remaining portions of the application in January 2012 to meet the March 12, 2012 deadline, the permittee realized that the full three rounds of testing had not been completed. The permittee conducted the second sampling event on January 26, 2012, and proposes to conduct the third sampling event prior to the application submittal due date for the 2012 permit reissuance.

Recommendations:

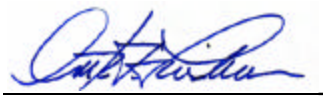
In the abovementioned section of the Form 2A Instructions, the justification provided for requiring at least two sampling events to take place within a 4 to 8 month period is that the application data " . . . must be representative of the treatment works' discharge and take into consideration seasonal variations." The typical effluent characterization and flow scheme at the Lawrenceville WWTP have not changed since the September 1, 2010 sampling event. Effluent data from Discharge Monitoring Reports submitted between January 2010 and January 2012 support the argument that there has been little variation in flow and treatment capabilities during the past two years. Consequently, the combined summer (September 2010) and winter (January 2012) sampling events would fulfill the aforementioned seasonal variation requirements, and therefore satisfy the intent of gathering representative effluent data for the purposes of permit development.

In addition to the intent of the Form 2A instructions being met, the permittee's waiver request supports the submittal of a complete application by the due date for the 2012 permit reissuance. Late application submittal may cause delays in the permit reissuance, the consequences of which are complicated by this being a major municipal facility and the permit being currently on the EPA's Priority List.

Staff recommends approval of the permittee's waiver request as described above.

☒ Approved ☐ Denied

Comments: DEQ approval is conditioned on subsequent concurrence/approval from EPA Region III.



Signature – Water Permit Manager

January 30, 2012
Date

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April 10, 2012

Mr. Jeremy Kazio
Department of Environmental Quality
4949-A Cox Road
Richmond, VA 23058

RE: Permit application waiver for Lawrenceville WWTP (VA0020354)

Dear Mr. Kazio:

The Town of Lawrenceville has submitted a VPDES permit VA0020354 renewal application recently and we are asking for a waiver for the application to the permit application requirements.

Per 9 VAC25-31-100J. , the Town of Lawrenceville is requesting a waiver to submit and use dissolved metals data in lieu of total recoverable metals data to complete Form 2A. Part D (Expanded Effluent Testing). The Virginia Water Quality Standards Regulations, 9VAC 25-260-5 et. seq., list requirements which apply to dissolved metals. Therefore, it is more representative to provide dissolved metals data to DEQ for your evaluation of reasonable potential by the plant effluent to exceed the water quality standards of the receiving waters. The Town of Lawrenceville believes that total recoverable metals data is not of material concern for these VPDES permits.

Please contact me at 434-848-2414 if you have any questions. Thank you for your consideration of this waiver request.

Sincerely,

C. J Dean, Town Manager

cc: Robbie Williams
Danny Barker

MEMORANDUM Error! Bookmark not defined.

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office

4949-A Cox Road **Glen Allen, VA 23060** **804/527-5020**

SUBJECT: Waiver Request for VA0020354 – Lawrenceville STP

TO: Curtis Linderman – Water Permit Manager

FROM: Jeremy Kazio – Water Permit Writer

DATE: April 19, 2012

COPIES: File

The attached waiver request, dated April 10, 2012, is from CJ Dean, Lawrenceville Town Manager. The permittee has requested a waiver of the total recoverable testing requirements contained in Part D. of Application Form 2A in lieu of testing for the dissolved form of each metal. The basis of the permittee's request is that metals criteria in the Virginia Water Quality Standards (9VAC 25-260) are in the dissolved form; therefore it would be more representative to provide dissolved metals data for use in performing reasonable potential analysis of the effluent to exceed water quality criteria in the receiving waters.

The facility is a municipal major discharging to a freshwater stream (Roses Creek) in the Meherrin River Basin. Therefore, the permittee must fulfill Attachment A testing requirements as well as all parameters contained in Part D. of Application Form 2A.

Recommendations:

I recommend approving the waiver request with the following exception:

- Total Recoverable Selenium

In requesting the abovementioned waiver, the permittee is trying to eliminate redundant testing while fulfilling the requirements of Attachment A and Form 2A. Most of the metals parameters applicable to the permittee's testing requirements are shared between these two forms. The metals criteria contained in the Water Quality Standards (9 VAC 25-260) for freshwater are based on the dissolved form of those metals due to bioavailability. The exception to this is Selenium.

☒ Approved as Recommended ☐ Denied

Comments:

Approved as recommended for the 2012 permit cycle, only.

Signature

May 15, 2012
Date

Attachment L

EPA Review

Kazio, Jeremy (DEQ)

From: Mark Smith [Smith.Mark@epamail.epa.gov]
Sent: Thursday, June 28, 2012 2:41 PM
To: Daub, Elleanore (DEQ); Kazio, Jeremy (DEQ)
Cc: Evelyn MacKnight
Subject: Fw: VA0020354: Lawrenceville WWTP 2012 Permit Reissuance Review

Hello Elleanore and Jeremy. We received the draft permit for Lawrenceville WWTP (VA0020354) on 6/13/12. In the interest of focusing available resources, EPA exercised its discretion in the review of this State-submitted permit and has chosen to perform a limited review on the TMDL requirements. As a result of this limited review, we have no comments related to the TMDL requirements. Thanks
----- Forwarded by Mark Smith/R3/USEPA/US on 06/28/2012 02:21 PM -----

From: "Kazio, Jeremy (DEQ)" <Jeremy.Kazio@deq.virginia.gov>
To: Mark Smith/R3/USEPA/US@EPA
Cc: Nancy Ford/R3/USEPA/US@EPA
Date: 06/13/2012 02:55 PM
Subject: VA0020354: Lawrenceville WWTP 2012 Permit Reissuance Review

---

Mark and Nancy,

This email is to transmit the subject draft VPDES permit and fact sheet for your 30-day review. This facility is a municipal major with a design flow of 1.2 MGD. The permit is on EPA's Priority List, and it expires on September 10, 2012.

Please note that the permittee requested two separate application waivers which were approved at the State level. The waiver requests and VA DEQ approvals are contained in Attachment K of the draft fact sheet attachments.

All pertinent documents have been posted to the VA DEQ's FTP site, and may be accessed by clicking on the following hyperlink:

ftp://ftp.deq.virginia.gov/wps/EPA/PRO/VA0020354/

Please don't hesitate to contact me if you have any questions or concerns.

Thank you.

Jeremy S. Kazio
Water Permit Writer
DEQ Piedmont Regional Office
4949-A Cox Road
Glen Allen, VA 23060
Tel: (804) 527-5044

DEQ Website | Piedmont Regional Office